

BULLETIN
OF
THE AMERICAN MUSEUM OF NATURAL HISTORY

VOLUME XXXIX, 1918

59.57,98(6)

**Article I.—A REVISION OF THE VESPIDÆ OF THE BELGIAN
CONGO BASED ON THE COLLECTION OF THE AMERICAN
MUSEUM CONGO EXPEDITION, WITH A LIST OF
ETHIOPIAN DIPLOPTEROUS WASPS¹**

BY J. BEQUAERT

PLATES I TO VI AND 267 TEXT FIGURES

CONTENTS

	PAGE
INTRODUCTION	2
Terminology	4
New Species and Varieties, with Their Type Localities	6
Approximate Location of Places Mentioned in This Paper	7
On Specific Characters in the Vespidae	8
Some Remarks on the Classification of the Diplopterous Wasps	12
Peculiarities of the Ethiopian Wasp Fauna	18
Key to the Genera of Vespidae, except the Masarinæ, Known to Occur in the Ethiopian Region	25
DESCRIPTIVE ACCOUNT OF THE VESPIDÆ OF THE BELGIAN CONGO	29
Raphiglossinæ	29
<i>Raphiglossa</i> S. Saunders	29

¹ Scientific Results of the Congo Expedition. Entomology, No. 2.

	PAGE
Zethinæ	30
<i>Zethus</i> Fabricius	30
<i>Paramischocyttarus</i> Magretti	35
<i>Labus</i> Saussure	41
Eumeninæ	54
<i>Eumenes</i> Latreille	54
<i>Pachymenes</i> Saussure	87
<i>Nortonia</i> Saussure	90
<i>Ancistrocerus</i> Wesmael	112
<i>Odynerus</i> Latreille	120
<i>Pterochilus</i> Klug	194
<i>Synagris</i> Latreille	195
<i>Rhynchalastor</i> Meade Waldo	228
Epiponinæ	230
<i>Belonogaster</i> Saussure	230
<i>Polybioides</i> R. du Buysson	238
Ropalidiinæ	244
<i>Ropalidia</i> Guérin	244
Polistinæ	252
<i>Polistes</i> Latreille	252
EXPLANATION OF PLATES	265
A BIBLIOGRAPHIC AND SYNONYMIC CATALOGUE OF THE ETHIOPIAN VESPIDÆ	266
INDEX	351

INTRODUCTION

For many years I have been eagerly planning the study of the Hymenoptera of the Belgian Congo, to which I had devoted all my spare time during five years of travel in various regions of Africa. Unfortunately, conditions in Europe deprived me of the fruits of all but a small part of my own collecting. But, coming to America, I found among the splendid collections of the American Museum Congo Expedition such a unique series of Vespidae that my project, I felt, might be satisfactorily realized. The cordial welcome extended to me by Prof. Henry Fairfield Osborn, President of The American Museum of Natural History, and the great privileges offered then by Dr. Lucas, Director, placed me in such ideal conditions that I was able to devote myself completely to my favorite task. It was a great pleasure for me to be thus associated with Prof. H. E. Crampton, Curator of Invertebrate Zoölogy. To Dr. Frank E. Lutz, Associate Curator of Invertebrate Zoölogy, I am especially grateful for many kindnesses throughout the preparation of this paper and for invaluable advice

during publication. Prof. Wm. M. Wheeler, Dean of the Bussey Institution, Harvard University, and Honorary Curator of Social Insects at the American Museum, has offered me much encouragement and, after the completion of the manuscript, most kindly gave me the benefit of his competent criticism. I am indebted to Mr. J. C. Crawford, Dr. J. C. Bradley, and Mr. Nathan Banks for the opportunity of studying various African wasps belonging to the U. S. National Museum, Cornell University, and the Museum of Comparative Zoölogy of Harvard University; also to Dr. H. Brauns in Willowmore, Cape Colony, for sending a collection of South African species.

The collection of Vespidæ made by Messrs. H. Lang and J. P. Chapin, leaders of the American Museum Congo Expedition, contains over 2700 specimens and is, therefore, the most extensive ever made for that group in the Ethiopian Region. From June 1909 to October 1915, they explored the Congo Basin in its entire width from the estuary to the borders of the Anglo-Egyptian Sudan. Although collecting was done everywhere along the journey, the best series fortunately came from regions whose wasp fauna was practically unknown: the Ituri forests and the savannahs of the North-eastern Uele. I have included in this study a few specimens from the Uele which I owe to the generosity of my friend, Dr. J. Rodhain; also a small number of wasps (about 300) which I personally collected during the last months of my stay in the Belgian Congo. These come chiefly from Mount Ruwenzori, the Semliki Forest, the region between Lake Albert Edward and Lake Kivu, and the interesting forests between Lake Kivu and the Lualaba River.

The comparatively large area thus covered by collecting enabled me to study most of the species of diplopterous wasps known from the Belgian Congo. Since many of them were represented by large series and in a perfect state of preservation, I have attempted to review all the Vespidæ of that region. The present publication, therefore, not only gives keys to the genera and species but, in many cases, discusses the limits and characters of the genera and gives new descriptions with detail drawings of species previously named. This was found necessary as many of the common species are still very imperfectly known, the result being that they are often not recognized and are then redescribed as new. Special care has also been taken to include what is known about the life histories of the African wasps, in order to interest field observers in a further study of the subject. The paper concludes with a bibliographic and synonymic list of the Ethiopian diplopterous wasps, originally compiled for my personal use in the preparation of the descriptive list of Congo species. It is published with the hope of saving the time of subsequent workers; it may also contain

some useful suggestions as to the taxonomy and synonymy of the group. Since the bibliography and synonymy are treated as completely as possible in this catalogue, I have not repeated the synonyms of the Congo genera and species in the paper itself. Only those references have been given which are necessary to an understanding of the text or which concern non-Ethiopian species.

In order to show how much the collection made by the American Museum Congo Expedition has added to our knowledge of the wasps of the Belgian Congo, the following figures may prove of some interest: including a few species which have been secured by myself, the collection contains representatives of 83 forms considered of specific rank and 24 well-marked color varieties; among these, 21 species and 9 varieties are here described for the first time. Only 25 of the remaining 62 species had hitherto been found within the boundaries of the Belgian Congo, the other 37 species being new for that region. Together with forms previously recorded but which are not represented in this collection, 101 species of Vespidae are at the present time definitely known to occur in that country (see the table of Ethiopian genera, p. 21). In my opinion, based on my personal collecting experiences, this number gives a fair idea of the wasp fauna of that part of Equatorial Africa; it possesses, therefore, about one-fifth of the total number of Vespidae described from the entire Ethiopian region.

The text figures have been drawn with a camera lucida by myself, with the exception of Figures 92 to 95, which were made by Mrs. H. Ziska. The two color plates are reproductions of water-colors by Mrs. Edna Beutenmüller. My indebtedness is especially due to Mr. Herbert Lang for his valuable photographs of different phases of wasp life, which are reproduced on Plates III to VI, as well as for the use of his field notes on the same subject. For many students, these will certainly prove to be the most interesting part of this paper.

TERMINOLOGY

As some technical terms found in this paper, although in continual use among modern students of wasps, have not yet reached entomological glossaries, it might be desirable to explain them briefly.

Tyloides is a convenient term which has been used by R. du Buysson¹ for the elongate swellings or tubercles found on the under side of the antennæ in the males of many social wasps, such as *Vespa*, *Belonogaster*, *Polistes*,

¹ Ann. Soc. entom. France, LXXII, 1903, p. 268.

and others. They are shown in Fig. 254, on the under side of the antennæ of *Polistes aquilinus* ♂.

The *oculo-malar space* (*spatium oculo-mandibulare*) is the space which separates the inferior angle of the eyes from the insertion of the mandibles. The term *cheek* or *gena* has often been used by recent writers for this part; I believe, however, that this may be a source of confusion. Older entomologists have called that part of the face which separates the clypeus from the inner orbits "cheek." In many *Vespidæ*, especially in the males of *Polistes*, the shape of these true cheeks is of taxonomic importance and care should therefore be taken to avoid the misuse of that term.¹

Extensive use has been made, in the descriptions, of characters presented by different parts of the thorax; it may therefore be well to call attention to Figs. 128, 135, and 249, explaining the thoracic terminology. I have accepted the interpretations of Snodgrass² for the subdivisions of the mesopleura (p. 253), although I dislike to use the new term *prepectus* for that part of the pleura which has been known for so many years as *epicnemium*.³ In the difficult genus *Odynerus*, the characters offered by the propodeum (metathorax of H. de Saussure) are of the utmost importance. I have used, for these parts, the names introduced by H. de Saussure more than sixty years ago.⁴ A very clear explanation of the structure of the propodeum in *Odynerus* is found also in A. v. Schulthess' Revision of the *Vespidæ* of Switzerland.⁵

The posterior part of the propodeum, at the articulation of the abdomen, presents on each side of the extensory muscle a flattened, scale- or tooth-like appendage; these two appendages are often enlarged and placed close together on the middle line, forming a *valvula*⁶ around the extensory muscle (Figs. 135 and 249, *va*).

The *posttegulæ* are narrow expansions of the lateral posterior angles of the mesonotum, projecting on each side between the tegulæ and the anterior margin of the scutellum. They have been described, though not named, by Spinola.⁷ They are variously shaped and often more or less separated by a suture from the mesonotum (Figs. 81, 135, and 214, *pt.*). The term *para-tegulæ* has also been used by some authors for these organs (A. v. Schulthess).

¹ J. Pérez, Actes Soc. Linn. Bordeaux, LXIV, 1910, pp. 4-5. I cannot accept the reasons to the contrary given by A. v. Schulthess, Mitt. Schweiz. entom. Ges., XII, 4, 1913, p. 154, footnote.

² R. E. Snodgrass. The thorax of the Hymenoptera. Proc. U. S. Nat. Museum, Washington, XXXIX, No. 1774, 1910, pp. 37-91, Plates I-XVI.

³ *Epicnemial area* or *Epicnemialflur* of F. Kohl.

⁴ H. de Saussure, Etudes sur la famille des Vespides, III, Suppl., 1854, pp. 184-186, Pl. XII, figs. 1-3. Synopsis of American Wasps. Smithsonian Miscell. Coll., No. 254, 1875, p. 150.

⁵ A. v. Schulthess, Fauna Insectorum Helvetiæ. Hymenoptera, Fam. Diptoptera, 1887, pp. 56-57, Pl. II, fig. 14.

⁶ A. Ducke, Bol. Mus. Paraense, IV, 4, 1906, p. 656.

⁷ Ann. Soc. entom. France, VII, 1838, p. 501, footnote.

In dealing with the venation of the wing I have followed without restriction the nomenclature proposed by Rohwer and Gahan,¹ which is almost exactly that generally used by European hymenopterists.

Unless otherwise stated, the measurements of length are taken from the front of the head to the apical margin of the second tergite; they include head, thorax, and tergites 1 and 2: "(h. + th. + t. 1 + 2)." This procedure is now in general use among students of diplopterous wasps.

NEW SPECIES AND VARIETIES, WITH THEIR TYPE LOCALITIES ²

<i>Zethus rodhaini</i> .—	Walikale	p. 33
<i>Labus garambensis</i> .—	Garamba	p. 51
<i>Eumenes langi</i> .—	Boma	p. 84
<i>Pachymenes congensis</i> .—	Banana	p. 88
<i>Nortonia acarophila</i> .—	Faradje	p. 97
" <i>tricarinulata</i> .—	Lubutu	p. 99
" <i>malelensis</i> .—	Malela	p. 109
<i>Ancistrocerus kisangani</i> .—	Stanleyville	p. 115
" <i>zairensis</i> .—	Banana	p. 117
<i>Odynerus picturatus</i> .—	Thysville	p. 137
" <i>osborni</i> .—	Walikale	p. 141
" <i>cyanopterus</i> (Saussure), var. <i>congicus</i> .—	Avakubi	p. 146
" <i>rufoniger</i> .—	Stanleyville	p. 164
" <i>desperatus</i> .—	Stanleyville	p. 166
" <i>ueleensis</i> .—	Vankerekhovenville	p. 170
" <i>alboniger</i> .—	Thysville	p. 172
" <i>sheffieldi</i> Meade Waldo, var. <i>marginifasciatus</i> .—	Faradje	p. 176
" <i>congolensis</i> .—	Boma	p. 176
" <i>lateralis</i> (Fabricius), var. <i>lateropictus</i> .—	Boma	p. 181
" <i>kabarensis</i> .—	Kabare	p. 186
" <i>chapini</i> .—	Stanleyville	p. 188
" <i>histrionimimus</i> .—	Banana	p. 190
" <i>rhizophorarum</i> .—	Malela	p. 192
<i>Synagris cornuta</i> (Linné), var. <i>rufithorax</i> .—	Malela	p. 208
" " " var. <i>ituriensis</i> .—	Risimu	p. 209
" " " var. <i>flavofasciata</i> .—	Medje	p. 210
" " " var. <i>similis</i> .—	Medje	p. 210
" " " var. <i>maculata</i> .—	Medje	p. 210
" <i>rufopicta</i> Tullgren, var. <i>mimetica</i> .—	Medje	p. 226
<i>Polistes macrocephalus</i> .—	Walikale	p. 261

¹ S. A. Rohwer and A. B. Gahan, Horismology of the hymenopterous wing. Proc. Entom. Soc. Washington, XVIII, 1916, pp. 20-76.

² The types of all new species and varieties are deposited in The American Museum of Natural History.

The following names are proposed for the first time in the Catalogue of the Ethiopian Vespidae:

Odynerus ferruginatus, p. 298, for *Stenodynerus ferrugineus* A. v. Schulthess, 1914; *nec Odynerus ferrugineus* (Radoszkowsky), 1881.

Odynerus meade-waldoi, p. 305, for *Odynerus deceptor* G. Meade Waldo, 1915; *nec Odynerus deceptor* E. Saunders, 1905.

APPROXIMATE LOCATION OF PLACES MENTIONED IN THIS PAPER

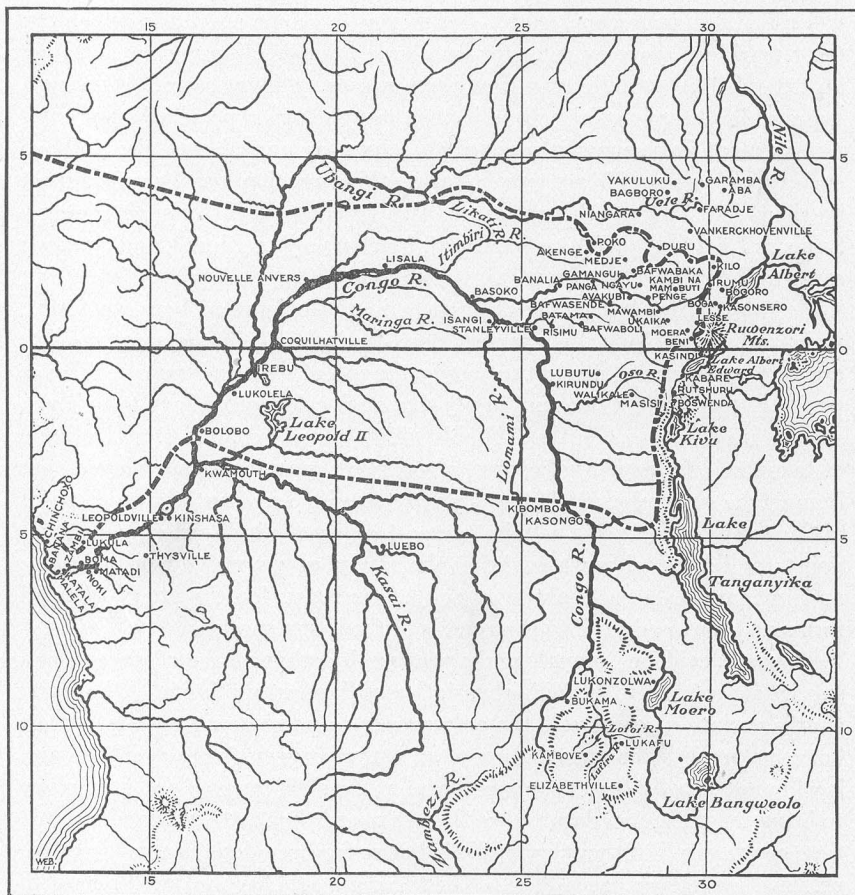
- Aba (Uele).—3° 50' N., 30° 10' E.
 Aka River (Uele).—3° 50' N., 29° E.
 Akenge (Uele).—2° 55' N., 26° 50' E.
 Albert Edward (Lake).—0° 30' S., 29° 30' E.
 Aruwimi River.—1° 20' N., 24° E.
 Avakubi (Ituri).—1° 20' N., 27° 40' E.
 Bafwabaka (Ituri).—2° 10' N., 27° 50' E.
 Bafwaboli (Stanleyville).—0° 40' N., 26° 10' E.
 Bafwasende (Stanleyville).—1° 10' N., 27° E.
 Bagboro (Uele).—4° 18' N., 29° E.
 Banalia (Aruwimi).—1° 30' N., 25° 40' E.
 Banana (Lower Congo).—6° S., 12° 20' E.
 Basoko (Aruwimi).—1° 20' N., 23° 35' E.
 Batama (Stanleyville).—1° N., 26° 40' E.
 Bengamisa (Stanleyville).—1° N., 25° 10' E.
 Beni (Semliki).—0° 30' N., 29° 30' E.
 Bogoro (Upper Ituri).—1° 30' N., 30° 20' E.
 Boma (Lower Congo).—5° 50' S., 13° 10' E.
 Boswenda (Kivu).—1° 20' S., 29° 20' E.
 Bukama (Katanga).—9° 20' S., 25° 55' E.
 Butagu River (Mt. Ruwenzori).—0° 30' N., 29° 50' E.
 Coquilhatville (Equator).—0° 1' N., 18° 20' E.
 Duru (Uele).—3° N., 28° 30' E.
 Epulu River (Ituri).—1° 20' N., 28° 40' E.
 Faradje (Uele).—3° 40' N., 29° 40' E.
 Gamangui (Ituri).—2° 10' N., 27° 20' E.
 Garamba (Uele).—4° 10' N., 29° 40' E.
 Irumu (Upper Ituri).—1° 20' N., 30° E.
 Isangi (Lomami).—0° 50' N., 24° 15' E.
 Itimbiri River.—2° 10' N., 23° E.
 Ituri River.—1° 30' N., 26° to 30° E.
 Kabare (Kivu).—0° 35' S., 29° 30' E.
 Kambi na Mambuti (Ituri).—1° 20' N., 29° E.
 Kasindi (Kivu).—0°, 29° 40' E.
 Kasonsero (Semliki).—1° N., 30° 10' E.
 Katala (Lower Congo).—6° S., 12° 45' E.
 Kibombo (Manyema).—4° S., 26° E.

Kilo (Upper Ituri).—1° 55' N., 30' E.
 Kinshasa (Lower Congo).—4° 20' S., 15° 20' E.
 Kirundu (Ponthierville).—1° 15' S., 25° 30' E.
 Kivu (Lake).—2° S., 29° E.
 Kwamouth (Lower Congo).—3° 20' S., 16° 10' E.
 Leopoldville (Lower Congo).—4° 25' S., 15° 20' E.
 Lesse (Semliki).—0° 20' N., 29° 40' E.
 Lisala (Bangala).—2° 10' N., 21° 30' E.
 Lubila River (Stanleyville).—1° N., 26° 30' E.
 Lubutu (Ponthierville).—0° 40' S., 26° 40' E.
 Luebo (Kasai).—5° 25' S., 21° 25' E.
 Lukula (Lower Congo).—5° 25' S., 13° E.
 Malela (Lower Congo).—6° S., 12° 40' E.
 Masisi (Kivu).—1° S., 28° 30' E.
 Matadi (Lower Congo).—5° 50' S., 13° 35' E.
 Medje (Ituri).—2° 25' N., 27° 30' E.
 Niangara (Uele).—3° 40' N., 27° 50' E.
 Noki (Angola).—5° 50' S., 13° 30' E.
 Nouvelle Anvers (Bangala).—1° 40' N., 19° 10' E.
 Oso River (Ponthierville).—1° S., 27° 20' E.
 Panga (Aruwimi).—1° 45' N., 26° 15' E.
 Penge (Ituri).—1° 25' N., 28° 15' E.
 Poko (Uele).—3° 10' N., 26° 50' E.
 Risimu (Stanleyville).—1° N., 26° 45' E.
 Rutshuru (Kivu).—1° 15' S., 29° 30' E.
 Ruwenzori (Mount).—0° 30' N., 29° 50' E.
 Semliki River.—0° to 1° N., 29° 30' E.
 Stanleyville.—0° 30' N., 25° 15' E.
 Thysville (Lower Congo).—5° 30' S., 15° E.
 Uele River.—3° 30' N., 23° to 30° E.
 Vankerckhovenille (Uele).—3° 20' N., 29° 20' E.
 Walikale (Ponthierville).—1° 25' S., 28° E.
 Yakuluku (Uele).—4° 20' N., 28° 50' E.
 Zambezi (Lower Congo).—6° S., 12° 50' E.

ON SPECIFIC CHARACTERS IN THE VESPIDÆ

In the course of the work preparatory to this paper, all the previous descriptions of African wasps were compiled. In looking over the list in the second part, it will be noted that many forms described as "species" have been referred to others previously named, either as mere synonyms or as color variations. The list contains, nevertheless, a large number of names to which at present specific rank must be given, although further study will enable us to unite many of them. In some cases, where the description was made exclusively on the color pattern, it will hardly be

possible ever to reach a definite conclusion. This is especially true for the species described by F. Walker in 1871, of which the types are lost.¹



Map of the Congo Basin, showing localities mentioned in the present paper, and their location in the forest or in the savannah. The broken line indicates the limits of the West African rain forest, forming a broad, continuous belt on both sides of the Equator. (Compare with the botanical map, p. 19).

During the past months I have given most of my time to a study of the diplopterous wasps including species from other parts of the world. I became gradually convinced that the chief characters for separating the

¹ W. Innes Bey, Bull. Soc. entom. d'Egypte, (1911), fasc. 3, 1912, pp. 97-98.

species of this group must be sought in structure and sculpture, and that the color of the integument has scarcely any value for this purpose. I feel confident that every student of the group, who works with extensive material, will reach the same conclusion. There may be some species in which the color markings are very constant in a large number of specimens and over an extended geographic area, but these are exceptional cases. As a rule, types which are remarkably fixed in their morphological peculiarities present a very great variation with regard to coloration and also to size. When such types have a wide geographic range, this variation may become almost inexhaustible. Good illustrations of this fact are given by such common forms as *Eumenes maxillosus* (de Geer), *Eumenes caffer* (Linné), and *Synagris cornuta* (Linné).

It may be held that the differences in the coloration between forms, which on morphological characters must be included in the same species, are very often strong enough to justify the use of a distinct name. This is perfectly true; but it does not imply that such color forms have to be given specific rank, even when they inhabit widely distant countries. The limits of taxonomic forms will, of course, always be a matter of convenience; yet it must be remembered that systematic studies have not the purpose of giving to each specimen a definite name; they are the indispensable starting-point for biological work and for the study of geographic distribution; and in many cases also the only solid foundation for the study of fossil forms and for inquiries into the genesis of the living species.

There is evidence enough at the present time that all the characters of a species are subject to individual variation within certain limits. The study of this variation constitutes the only proper way to know a species. This, however, implies the examination of an extensive series of each species and it will undoubtedly become, sooner or later, the chief purpose of Entomology to bring together such data rather than to overestimate the value of isolated type specimens. Although very little has so far been done in this direction, personal experience has led me to the following conclusions¹ with regard to the diplopterous wasps —

1. The variation of the same character is very different from one group to another; as regards this, there is no general rule. A certain character or complex of characters may afford through its almost absolute fixity excellent specific or generic distinctions in one group, whereas in another group the great variation of such characters makes them almost useless taxonomically. This is true for structural peculiarities as well as for color.

¹ It must be well understood that these conclusions do not necessarily apply to any other group of insects, not even to other Hymenoptera.

2. Structural characters include the shape and sculpture of the different organs of the insect, and also the pilosity, since this is only a part of the integument. Among the diplopterous wasps most of these characters are rather constant. An exception to this rule is the wing venation, or at least certain parts of it; the shape of the cubital cells is extremely variable and in some cases not even of specific value. Another good illustration of variable morphological characters is the protuberances at the base of the mandibles in the male *Synagris cornuta* (Linné).

3. The variation of the color markings is always much greater than that of the structural characters. In many cases we may find an almost constant structural type presenting numerous, different color varieties; it seems evident that these color forms are genetically related; the color characters may be more recent and therefore less stable, or they may be more subject to modifications under the influence of external factors. At any rate, they may be considered as different clothes worn by the same morphological type, this type being of monophyletic origin. The problem becomes still more interesting when we note the occurrence of the same color pattern, the same cloth, in very different morphological types, often belonging to different genera. This remarkable phenomenon is of frequent occurrence among diplopterous wasps. Very often different species of the same zoögeographic area offer, in fact, such a deceiving similitude in their color pattern that the student has to put the color decidedly in the background in order to classify them properly. Many illustrations of such "mimetic" color groups will be given in this paper, but I have some doubts as to whether protective mimicry is sufficient to explain the phenomenon.

The foregoing remarks will, I think, show that I clearly recognize the value of recording and describing the color variations among wasps. If I do not give them specific rank it is because I believe that they are subordinate to the morphological characters. The taxonomist must find some way to express these relationships clearly and the use of trinomials seems to be in many respects the least objectionable.

Therefore, I use the word *species* in the sense in which it is employed by many recent students of Hymenoptera and which is usually associated with the Vienna School. A species includes a complex of forms belonging to the same genus and agreeing constantly¹ in sculptural and plastic characters, although color and pattern may be very variable. The different color variations of such a morphological species are simply referred to as *varieties* in the present paper, because this term is vague and neutral enough not to imply any presumption as to the true status of such color forms,

¹ Within the limits of individual variation.

whether they are geographic races or merely individual aberrations, or "elementary species." The term *subspecies* has been avoided because certain authors restrict it to a complex of forms of the same species, as defined above, agreeing constantly in color or pattern and inhabiting the same geographic area¹; whereas others use the same term for subdivisions of the species presenting slight differences in form and sculpture.²

Particular attention has been paid in this paper to a determination of the different color forms of a given morphological type, and many suggestions have been made with regard to this. It is, however, scarcely to be expected that all the conclusions I have reached will prove to be exact. A very valuable contribution to the subject would be the examination of the types of the different species whose synonymy is here either positively asserted or merely suggested.

SOME REMARKS ON THE CLASSIFICATION OF THE DIPLOPTEROUS WASPS

The classification used here is, in many respects, different from that generally accepted for the diplopterous wasps. I hope to have, at some time in the future, an opportunity of discussing in detail the various reasons which have brought me to my present views on this subject. The following is only a summary of my conclusions.

Since no Masaridæ have been found, so far as I know, within the boundaries of the Belgian Congo, I had little opportunity of studying this group. However, Prof. J. Chester Bradley, who has recently completed a revision of the taxonomy of the Masaridæ, has kindly informed me that he cannot accept this group as a family distinct from the rest of the Diploptera. All the diplopterous wasps which are not masarids have generally been divided, since Latreille's time, according to their habits into two main groups which have been called either families or subfamilies: the Eumenidæ or Eumeninæ for the solitary species, and the Vespidæ or Vespinae including all the forms with social habits. It is not difficult to show that such a division gives no adequate picture of the phylogeny of the group; in fact the solitary as well as the social wasps are polyphyletic. It is, therefore, not surprising to find that no morphological characters can be discovered which might enable one to place a given species with certainty either with the social or with the solitary wasps.

There is, indeed, much to say in favor of including all the diplopterous

¹ W. A. Schulz, *Spolia Hymenopterologica*, 1906, p. 5.

² Wm. M. Wheeler, *Ants*, 1910, p. 131.

wasps in a single family Vespidae, which may then be subdivided into a number of subfamilies, corresponding to as many phylogenetic strains. It is obvious that such a classification will undergo many modifications with a further study of the evolution of the group. I believe, however, that a first attempt in this direction is not untimely. I propose, therefore, to divide into eight subfamilies those diplopterous wasps which were formerly included in the "Eumeninae" and "Vespinæ." These subfamilies are briefly characterized below. According to Prof. Bradley's views, the members of the old "family" Masaridae should form two additional subfamilies in this series:

The Euparagiinae, include *Euparagia* Cresson, *Paramasaris* P. Cameron, *Plesiozethus* P. Cameron, *Paragia* Shuckard, *Metaparagia* G. Meade Waldo. Twenty-seven species, in the Nearctic (2), Neotropical (1), and Australian (24) regions.

The Masarinae, include *Masaris* Fabricius, *Masariella* H. Brauns, *Ceramius* Latreille, *Celonites* Latreille, *Jugurtia* Saussure, *Quartinia* Gribodo, *Ceramiopsis* Zavattari, *Trimeria* Saussure, and *Pseudomasaris* Ashmead. Sixty-nine species, in the Palearctic (21), Nearctic (10), Ethiopian (31), Oriental (1), and Neotropical (6) regions.

1. RAPHIGLOSSINÆ.—Clypeus rounded, broadly truncate, or emarginate at the apex. Mandibles short and broad, closed underneath the clypeus, with a truncate, toothed apex. Apical joints of the antennæ in the male normal. Tarsal claws bifid. Middle tibiæ with one or two apical spurs. Second and third cubital cells of the front wings each receiving a recurrent nervure.

There are 14 species belonging to 4 genera: *Raphiglossa* S. Saunders, *Psiloglossa* S. Saunders, *Pararhaphidoglossa* A. v. Schulthess, and *Gayella* Spinola. The Mediterranean subregion has 8 species; the Ethiopian region, 4 species; Central America, 1 species; and Chile, 1 species.

Psiloglossa simplicipes Rohwer,¹ from New Mexico, does not belong here, but is an *Euparagia*. The longitudinal plaiting of the front wings is very obsolete in *Gayella*; in fact I was unable to discover any trace of it in the two specimens I have seen. It is possible that this genus must be removed from the Raphiglossinæ.

So far as known, the habits of the members of this group are truly solitary.

2. ZETHINÆ.—Clypeus rounded, truncate, or emarginate at the apex. Mandibles short, obliquely truncate and toothed at the apex, folding above each other underneath the clypeus or very slightly crossing. Antennæ

¹ Entom. News, XX, 1909, p. 357.

of the male of variable shape. Tarsal claws bifid. Middle tibiæ with one or two apical spurs. Second cubital cell of the front wing receiving both recurrent nervures. First abdominal segment more or less petiole-shaped.

There are 217 species distributed throughout the tropical parts of the world: 4 in the Palearctic, 2 in the Nearctic, 27 in the Ethiopian, 36 in the Oriental and Australian, and 157 in the Neotropical regions. They belong to the following genera: *Zethus* Fabricius (including *Zethusculus* Saussure, *Didymogastra* Perty, *Heros* Saussure, *Calligaster* Saussure, *Wettsteinia* Dalla Torre, and *Laboides* Zavattari), *Pseudozethus* Perkins, *Ischnocalia* Perkins, *Elimus* Saussure, *Macrocalymma* Perkins, *Discaelius* Latreille, *Labus* Saussure, *Paramischocyttarus* Magretti, *Ischnogasteroides* Magretti, *Pareumenes* Saussure, and *Zethoides* Fox.

What little is known of the habits shows that the Zethinæ are solitary wasps, although some species undoubtedly indicate a tendency towards communistic life.

3. EUMENINÆ.—Clypeus rounded, truncate, or emarginate at the apex, rarely pointed. Mandibles more or less elongate, either crossing each other to form a distinct X or placed parallel to each other in a long and sharp beak; always projecting over the apex of the clypeus; their long inner margin with more or less distinct teeth or notches. Antennæ in the male of variable shape. Tarsal claws bifid or toothed, very exceptionally simple. Middle tibiæ with one, rarely with two spurs, or without any spurs at all. Second cubital cell receiving both recurrent nervures.

About 1900 species, from all parts of the world: 337 in the Palearctic, 223 in the Nearctic, 338 in the Ethiopian, 513 in the Oriental and Australian, and 488 in the Neotropical regions. The following genera belong in this subfamily: *Eumenes* Latreille, *Katamenes* Meade Waldo, *Ectopioglossa* Perkins, *Pseudochilus* Saussure, *Ctenochilus* Saussure, *Pachymenes* Saussure, *Nortonia* Saussure, *Antezumia* Saussure, *Parazumia* Saussure, *Montezumia* Saussure, *Monobia* Saussure, *Monerebia* Saussure, *Plagiolabra* A. v. Schulthess, *Odynerus* Latreille, *Ancistrocerus* Wesmæl, *Pterochilus* Klug, *Gribodia* Zavattari, *Synagris* Latreille, *Rhynchalastor* Meade Waldo, *Alastor* Lepeletier, *Paralastor* Saussure, and *Alastoroides* Saussure.

The Eumeninæ are true solitary wasps; in certain species there is evidently a progression towards social habits, similar to that found in some *Zethus*.

4. STENOGASTRINÆ.—Clypeus projecting in a rounded or sharp point. Labial palpi 4-jointed, maxillary palpi 6-jointed. Mandibles slender, often elongate and beak-like, toothed along the inner margin in both sexes or unarmed in the male. Antennæ 12-jointed in the female and worker; 13-jointed in the male, the apical joints in this sex normal (as in the female).

Tarsal claws with a distinct tooth. Middle tibiæ with two apical spurs. The three cubital cells of the front wings are about of equal size, the second and third being unusually large and rectangular; the two recurrent nervures received by the second cubital cell. Anal lobe of the hind wings well developed. Mesepisterna divided by a distinct median episternal groove into an upper and a lower plate. First abdominal segment narrowly petioliform.

The only genus, *Stenogaster* Guérin (= *Ichnogaster* Guérin), contains some 30 species from the Oriental and Australian regions.

The ethology of the members of this subfamily is exceedingly interesting and accurate observations on them would be of much value. Some species are known to be typical social wasps, building many-celled paper nests, very similar to those of *Polistes* and *Ropalidia*, with the cells arranged in a few superposed combs not included in a cover. It is not known whether there is a real distinction between the fertile females and workers. As to the manner in which new nests are started and the food given to the larvæ, we must also await further investigation. However, it has been claimed, apparently with reason, that some of the larger species have solitary habits, each female taking care of a nest of her own.

5. EPIPONINÆ.—Clypeus as a rule as broad as, or broader than, long, its apex pointed or ending in two small teeth; rarely longer than broad and truncate at the apex. Mandibles short and broad, toothed at the truncate apical margin, folded over each other underneath the clypeus. Antennæ in most of the genera 12-jointed in the female and worker; 13-jointed in the male, the apical joints in this sex normal or deformed; exceptionally the antennæ may be 11-jointed in the female and worker, 12-jointed in the male. Tarsal claws simple. Middle tibiæ as a rule with two apical spurs, very rarely with a single spur. Wing venation of the ordinary type, the second cubital cell receiving both recurrent nervures; the hind wings with a well-developed anal lobe. Extensory muscle of the abdomen fixed on the thorax in an oval valvula between the apical scales of the propodeum, the slit always broadly rounded at its upper angle. Thorax and abdomen variously shaped.

About 170 species, which are almost restricted to the tropical portions of the globe: 122 in the Neotropical, 37 in the Ethiopian, 10 in the Oriental and Australian, and 2 in the Nearctic regions. The genera are as follows: *Pseudochartergus* A. Ducke, *Protopolybia* A. Ducke, *Protonectarina* A. Ducke, *Caba* R. von Ihering (= *Nectarina* Shuckard), *Myrapetra* A. White (= *Polybia* Lepeletier), *Chartergus* Lepeletier, *Charterginus* Fox, *Clypearia* Saussure, *Metapolybia* Ducke, *Synæca* Saussure, *Synæcoides* Ducke, *Epipona* Latreille (= *Tatua* Saussure), *Mischocyttarus* Saussure, *Apoica* Lepeletier, *Polybioides* R. du Buysson, *Parapolybia* Saussure, *Leipomeles* K. Mœbius,

Gymnopolybia A. Ducke, *Stelopolybia* A. Ducke, *Parachartergus* R. von Ihering, *Pseudopolybia* Saussure, and *Belonogaster* Saussure.

This group is rather heterogeneous and will probably be further subdivided. All the species are true social wasps, but in some genera there is as yet no distinction between fertile females and workers. There are monogynous and polygynous species among them; and, in some cases, new nests are started by regular swarming. The architecture of the nests also varies very much, but always belongs to the same type within the limits of a genus. The nests are always aerial, built in the open or inside some cavity; the cell combs are sessile or pedunculate, and may be freely exposed or surrounded by a cover. The nests are generally built of vegetable fibres worked into a papery substance; exceptionally, part of the nest is made of clay. Some species store honey, but we do not know with certainty whether or not it is used to feed the larvæ.

6. *ROPALIDIINÆ*.—Clypeus broader than long, its apical margin only feebly projecting in the middle into a blunt or rounded point. Mandibles short and broad, their truncate apex sharply toothed, folding over each other underneath the margin of the clypeus. Labial palpi 4-jointed; maxillary palpi 6-jointed. Antennæ 12-jointed in the female and worker; 13-jointed in the male, in this sex the apical joint is normal or feebly curved. Tarsal claws simple. Middle tibiæ with two apical spurs. Wing venation of the ordinary type, the second cubital cell receiving both recurrent nervures; the hind wings with a well developed anal lobe. No median episternal groove subdividing the mesepisterna. Extensory muscle of the abdomen fixed on the thorax in a narrowly compressed valvula. Second abdominal segment bell-shaped, its tergite and sternite completely or for the most part fused.

There are about 132 species, which are only found in the tropical and subtropical parts of the Old World: 41 in the Ethiopian and 91 in the Oriental and Australian regions. They belong to three genera: *Ropalidia* Guérin (= *Icaria* Saussure), *Anthreneida* A. White, and *Paraicaria* Gribodo.

Typical social wasps, building paper nests composed of a single pedunculate comb of cells, not enclosed in a cover. There is a distinction between fertile females and workers; often several females start a nest together. The larvæ are fed with animal juices (p. 248).

7. *POLISTINÆ*.—Clypeus ending in a pointed angle, rarely rounded or almost truncate in some males. Mandibles short, quadrate, their apices truncate and sharply toothed, folded over each other underneath the clypeus. Labial palpi 4-jointed, maxillary palpi 6-jointed. Antennæ 12-jointed in the female and worker; 13-jointed in the male, the terminal joints in this sex either spirally rolled up or nearly normal. Tarsal claws

simple. Middle tibiæ with two apical spurs. Wing venation of the normal type, the second cubital cell receiving both recurrent nervures. Hind wings with a well-developed anal lobe. Extensory muscle of the abdomen fixed on the thorax in a narrow and much compressed valvula between the apical scales of the propodeum.

About 153 species, distributed all over the world: 6 in the Palearctic, 15 in the Nearctic, 21 in the Ethiopian, 64 in the Oriental and Australian, and 51 in the Neotropical regions. Two genera: *Polistes* Latreille and *Gyrostoma* Kirby and Spence.

These are true social wasps, with a differentiation into castes: fertile females, workers, and males. The species are, as a rule, monogynous, although several females have been observed to start a nest together. The paper nest consists of a free, pedunculate comb of cells. The larvæ are fed with animal matter; some species are known to store small quantities of honey (p. 257).

8. VESPINÆ.—Clypeus broadly truncate at the apical margin, which is feebly emarginate or ends in two slight lateral teeth. Mandibles short and broad, closed over each other underneath the clypeus, their apex truncate, broad, sharply toothed. Labial palpi 4-jointed, maxillary palpi 6-jointed. Antennæ 12-jointed in the female and worker; 13-jointed in the male, the apical joint in this sex normal. Tarsal claws simple. Middle tibiæ with two apical spurs. Wing venation of the ordinary type, both recurrent nervures being received in the second cubital cell; hind wings entire at the base, without anal lobe. No median episternal groove on the episterna of the mesopleura. First abdominal segment subsessile, broadly truncate at the base, with a distinct sharp or rounded angle between its anterior vertical and its posterior horizontal face.

Two genera, *Vespa* Linné and *Provespa* Ashmead, with 53 species: distributed over the Palearctic (16), Nearctic (13), Oriental and Australian (30) regions. One very doubtful species has been described from East Africa, and another reaches Southern Arabia.

These are the most typical of the social wasps. So far as known, the species are monogynous, the new colony being started by a single fecundated female. There is a distinct caste of unfecundated females or workers, which, however, sometimes produce parthenogenetic eggs. The nest is composed of several superposed combs of paper cells and is always enclosed in a cover; it may be placed under the ground, in some cavity, or hang freely in the air. One species, at least, does not build a nest of its own, but lives as an inquiline in the nests of other species and has no worker caste. The food of the larvæ consists of animal juices.

PECULIARITIES OF THE ETHIOPIAN WASP FAUNA

As generally recognized by zoölogists, the limits of the ETHIOPIAN REGION include continental Africa south of the tropic of Cancer, the southern half of Arabia, Sokotra, Fernando Po and the other islands of the Guinea Gulf, Madagascar with the Mascarenes and the adjacent islands from Rodriguez to the Seychelles. Towards the north, the Ethiopian region is very sharply separated from the Mediterranean part of the Palearctic region by a broad belt of deserts. It is a matter of personal opinion whether these deserts themselves may be called Ethiopian or Palearctic. They seem to present still some affinities with the Ethiopian region; and, in former times, when the dryness of the climate was not so pronounced as nowadays, the fauna and flora of the Sahara may have been even chiefly Ethiopian. At the present time, however, few of the Ethiopian animals occur north of the tropic of Cancer.¹

There is still some discussion as to a further subdivision of the Ethiopian region from a zoölogical viewpoint. The separation of Madagascar and the adjacent islands into a special MALAGASY SUBREGION is in general favor. Most of the zoölogists accept also a well characterized WEST AFRICAN or GUINEAN SUBREGION (Reichenow's West African forest region). It has long been believed that there was, furthermore, a sharp contrast between the fauna of East Africa and that of South Africa; but many of the genera which were considered by Wallace² as peculiar to a "South African sub-region" have since been found north of the Zambesi, even in Abyssinia and the Sudan.³ There seems now to be a general tendency to unite the Sudan, East and South Africa into a single main division, as Reichenow⁴ has suggested.

In the absence of an authoritative recent work dealing especially with the distribution of African animals in general, it has seemed more convenient to present a map (p. 19) of the botanical regions of that continent. This map is based on the latest publications of A. Engler,⁵ and may be useful for the study of the distribution of animal life also.

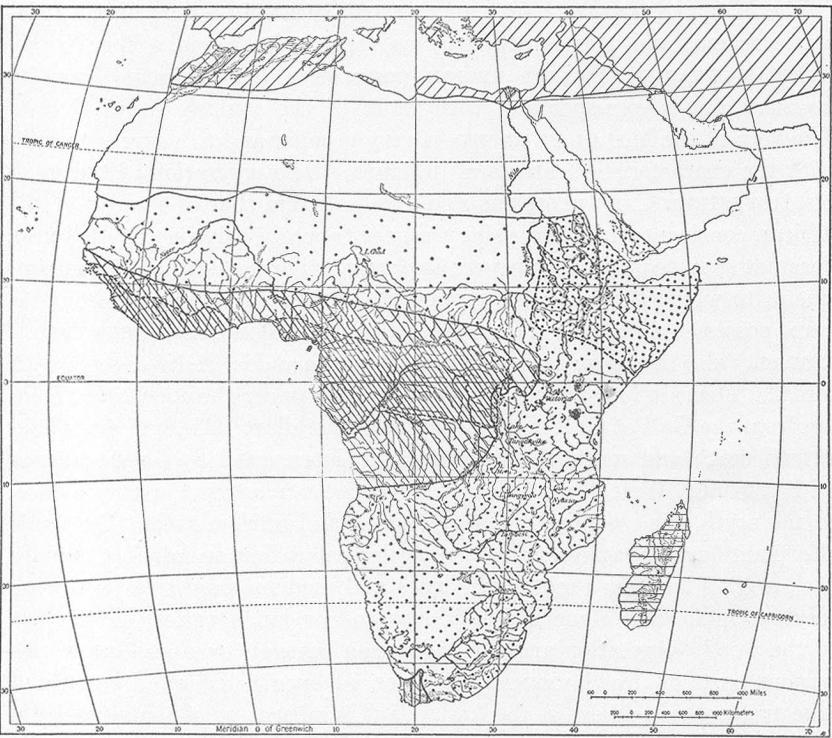
¹ According to E. Hartert, *Novitates Zoologicae*, XX, No. 1, 1913, p. 20, no tropical animals occur in Tidikelt, whereas the fauna of northern Air is decidedly tropical.

² A. R. Wallace, *The Geographical Distribution of Animals*, I, New York, 1876, pp. 258-269. F. E. Beddard, *A Text-Book of Zoogeography*, Cambridge, Engl., 1895, pp. 101-102, follows Wallace.

³ A. Reichenow, *Journ. f. Ornithologie*, XXXIV, 1886, p. 396. R. Lydekker, *A Geographical History of Mammals*, Cambridge, 1896, p. 261.

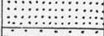
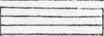
⁴ A. Reichenow, *Die Vögel Afrikas*, I, Neudamm, 1900, p. lxxxvii, with map.

⁵ A. Engler, *Pflanzengeographische Gliederung von Afrika*. Sitz. Ber. k. Preuss. Ak. Wiss. Berlin, 1908, II, pp. 781-837. *Die Pflanzenwelt Afrikas insbesondere seiner tropischen Gebiete*, I, Leipzig, 1910.



BOTANICAL REGIONS OF AFRICA

(After Engler)

- I. MEDITERRANEAN REGION 
- II. NORTH AFRICAN-ARABIAN DESERT REGION 
- III. ETHIOPIAN REGION
 - A. SAVANNAH PROVINCE
 - 1. Sudanese Subprovince 
 - 2. Northeastern Subprovince 
 - 3. Eastern and Southern Subprovince 
 - B. WESTERN FOREST PROVINCE 
 - Extent of Rain Forest indicated thus 
- IV. SOUTHWESTERN CAPE REGION 
- V. MALAGASY REGION 

The MEDITERRANEAN REGION of this map is merely a part of the Palearctic region, and this is also true as regards its fauna. The NORTH AFRICAN-ARABIAN DESERT REGION possesses a truly African flora, its northern limits corresponding with those of the striking genus *Acacia*. The flora of the MALAGASY REGION is very peculiar and this agrees entirely with the characteristic features of its fauna. The vegetation of the small SOUTHWESTERN CAPE REGION is also different from that of the rest of the African continent; it is surprising that the fauna of this very limited area does not seem to present many peculiar forms. The rest of the African continent, to which the name ETHIOPIAN REGION has been restricted on this map, possesses a rather uniform vegetation. Its WESTERN FOREST PROVINCE may also be known as the Guinean province and is chiefly covered with forest. The rain forest forms a continuous belt under the equator, stretching from the Gulf of Guinea to the thirtieth meridian. Areas of grass land extend north and south of this forest belt, interrupted by forest galleries with a typical West African flora. Beyond the Western Forest province, to the north, the east, and the south, grass land predominates. As a rule the plant growth agrees with the œcological definition of a savannah: i. e., a grass land with scattered shrubs and medium-sized trees¹; though local, edaphic, and climatic conditions produce much variety in the size of the woody vegetation and the proportion between trees and grass. In various parts of this SAVANNAH PROVINCE we even find limited patches of true tropical rain forest in the lowlands (Usambara) or of temperate rain forest in the montane region of the higher mountains (Kilimanjaro, Kenia, Ruwenzori, etc.). However, the flora of these forest patches shows little affinity with that of the West African rain forest. A further subdivision of the Savannah province into a SUDANESE, a NORTHEASTERN, and an EASTERN-AND-SOUTHERN SUBPROVINCE is of much less importance and only mentioned here for the sake of completeness.

The peculiarities of the Ethiopian wasp fauna may be best understood from a comparison with other portions of the globe. I have, therefore, shown in a table (p. 21) how the Ethiopian genera of Vespidae are represented in the various zoögeographic regions of the world. These figures, and also the total number of Vespidae occurring in each region, have been especially compiled for this paper. I have added the approximate extension in square miles of the regions because I believe that their relative size is a factor of importance if we want to appreciate duly the richness of their faunæ.

The diplopterous wasps, together with the Formicidæ, are more predomi-

¹ E. Warming. *Ecology of plants*. English edition. Oxford, 1909, p. 295.

Total Number of Known Species in the Various Regions

Ethiopian genera of Vespidae	Belgian Congo	Ethiopian	Oriental and Australian	Palaearctic	Neartic	Neotropical	Total
<i>Masaris</i>		3		1			4
<i>Masariella</i>		1					1
<i>Ceramius</i>		15		5			20
<i>Celonites</i>		9		8			16
<i>Jugurtia</i>		1		4			5
<i>Quartinia</i>		2	1	3			6
<i>Raphiglossa</i>	1	4		5			8
<i>Zethus</i>	1	4	10		2	154	170
<i>Elimus</i>		1	2				3
<i>Pareumenes</i>		1	6				7
<i>Paramischocyttarus</i>	1	3					3
<i>Ischnogasteroides</i>		1					1
<i>Labus</i>	3	17	5				22
<i>Eumenes</i>	5	25	65	18	10	126	240
<i>Pachymenes</i>	2	13	10		2	24	48
<i>Pseudochilus</i>		1					1
<i>Nortonia</i>	8	18		1		2	21
<i>Ancistrocerus</i>	6	19	29	54	57	91	250
<i>Montezumia</i>		1				29	30
<i>Odynerus</i>	33	221	281	217	131	165	1010
<i>Pterochilus</i>	1	9	6	41	20		76
<i>Synagris</i>	18	24					24
<i>Rhynchalastor</i>	1	2					2
<i>Alastor</i>		4	1	5		18	28
<i>Belonogaster</i>	9	35	1				35
<i>Polybioides</i>	2	2	2				4
<i>Ropalidia</i>	3	41	89				130
<i>Polistes</i>	7	21	63	6	15	51	152
<i>Vespa</i>		2	28	16	13		51
Total number of Vespidæ (includ- ing the non-Ethio- pian genera)	101	500	800	391	268	827	2760
Number of genera	16	29	35	16	13	40	81
Approximate area in square miles	900,000	11,500,000	7,000,000	14,000,000	6,500,000	5,500,000	44,500,000

nant in hot regions than the other groups of Hymenoptera. According to A. Handlirsch's¹ calculation, nearly two-thirds (1763) of the described species of Vespidae (2768) are found in the tropical parts of the world; while the remaining species are nearly equally divided between the cold temperate (468) and the warm temperate or subtropical (591) regions. There is a striking difference in this respect between the Vespidae and some of the other Hymenoptera, such as the Chalastogastra, Ichneumonidae, and Apidae. The partiality of the Vespidae for warm climates further appears from the fact that about one-half (46) of the total number of genera (81) are exclusively tropical, whereas only 17 genera are restricted to cold temperate or subtropical regions. If we enter the colder regions of the globe, the diplopterous wasps become gradually scarcer. In Europe and North America, the genera *Vespa*, *Eumenes*, and *Odynerus* have the most northern range, invading even true arctic regions. In Lapland, at about 70° N. lat., 8 species of *Vespa*, 8 of *Odynerus*, and the widely distributed *Eumenes coarctatus* (Linné) have been found.² Two species of *Vespa* and one of *Odynerus* are recorded from Alaska³; I have seen *Vespa norvegica* (Fabricius) from Point Barrow, north of 70° N. lat.

I have indicated before, in their broad lines, the areas covered by each of the ten subfamilies which I have come to recognize among the Vespidae. To repeat this briefly: the Eumeninae and Polistinae are cosmopolitan groups; the Masarinae, though widely distributed, are almost restricted to subtropical regions where they inhabit various disconnected areas; the Epiponinae and Zethinae are tropicopolitan, and the Raphiglossinae might perhaps be considered as having a similar distribution; the Ropalidiinae extend over the Ethiopian, Oriental, and Australian regions; the Vespinae range throughout the Palearctic, Nearctic, and Oriental regions; the Euparagiinae are Nearctic, Neotropical, and Australian; and the Stenogastrinae are endemic in the Oriental and Australian regions.

Handlirsch⁴ has shown that the Neotropical region, owing to its large proportion of endemic insect genera, is the richest and best characterized of the zoögeographic main divisions of the world. This is especially true for the diplopterous wasps, which present there a very large number of species and an extraordinary variety of form and habits. About one-half (40) of the described genera occur there and a large proportion of these (27) are endemic types. The numerous social species of Epiponinae are one of the most noticeable features of the South and Central American wasp fauna.

¹ Sitz. Ber. k. Ak. Wiss. Wien, math. naturw. Kl., CXXII, Heft 3, 1913, Abt. 1, pp. 372-373.

² H. Friese, Fauna arctica, II, 3, 1903, p. 479.

³ T. Kincaid, Proc. Washington Ac. Sc., II, 1900, p. 510.

⁴ Sitz. Ber. k. Ak. Wiss. Wien, math. naturw. Kl., CXXII, 3, 1913, Abt. 1, p. 413.

This subfamily is almost exclusively tropical. It is exceptionally abundant in the Neotropical region, offering there 19 genera, all of which are practically endemic. These social wasps do not go south of the Rio Negro in Argentina; nor are they found on the Chilean slopes of the Andes. In the Northern hemisphere, only two species, belonging to the genus *Mischocyttarus*, have crossed into the subtropical parts of the United States. Only three genera of Epiponinæ are found in the Old World tropics; one of them, *Parapolybia*, is exclusively Oriental; another, *Belonogaster*, is practically restricted to the Ethiopian region; the third, *Polybioides*, is equally distributed over both these regions. Negative features of the Neotropical region are the absence of the Stenogastrinæ, Ropalidiinæ, and Vespinae.

Apart from a few sporadic representatives of Neotropical genera, such as *Mischocyttarus*, *Zethus*, *Pachymenes*, and *Monobia*, the wasp fauna of the Nearctic region shows few striking features. Thirteen genera are represented there, and among them only three, belonging to the Euparagiinæ and Masarinæ, are endemic. Though its affinities are chiefly with the Palearctic region, most of its genera are practically cosmopolitan. I do not know of a single genus of Vespidae with a strictly Holarctic distribution, being found only in the Nearctic and Palearctic regions.

As might be expected, the Palearctic region has been thoroughly investigated. Yet its wasp fauna as a whole is not much richer than that of the Nearctic region. Of the sixteen genera found there, only one, *Psiloglossa*, is endemic; several of the others are cosmopolites (*Odynerus*, *Eumenes*, *Polistes*) or distributed over two or more regions. The absence from the Palearctic region of some types with a very wide range, such as *Zethus*, and of some true Old World forms, such as *Labus* and *Ropalidia*, is noteworthy.

In this sketch of the wasp faunæ of the different parts of the world, I shall treat the Australian and Oriental regions together, because the limits between them have not yet been definitely settled. However, this method does not allow of a very clear understanding of the faunal relationships. Considering the comparatively small extension of the Australian and Oriental regions, which is about that of the Nearctic region, their wasp fauna is remarkably rich. Thirty-five genera have been found in these regions; eighteen are endemic, but many of them (nine genera, with 142 species) are restricted to the Australian continent. The high number of species is chiefly made up by a few genera of rather wide distribution: *Odynerus*, *Eumenes*, *Ropalidia*, *Polistes*, and *Vespa*. The range of *Vespa* is noteworthy because no other genus of Vespidae has a similar distribution: it is restricted to the Palearctic, Nearctic, and Oriental regions and extends also over New Guinea, Southern Arabia and Egypt. *Provespa* is a closely allied type, adapted to nocturnal habits and restricted to the Oriental region. A

truly Oriental type is *Stenogaster*, the only genus of the Stenogastrinae; some of its species are found in New Guinea, but it has never been recorded from Australia proper. Apparently no diplopterous wasps have been found in New Zealand.¹ This is the more extraordinary since the Hawaiian Islands possess 119 species of Vespidae belonging to three genera: *Polistes* (2), *Odynerus* (114), and *Pterochilus* (3). The genus *Ropalidia* is remarkable for being very rich in species and restricted to the tropical part of the Old World. However, in some other genera there are species with a similar distribution, as I shall have an opportunity to point out farther on. In many ways, the Oriental region is intermediate between the Ethiopian and Australian regions.

The Ethiopian region is much poorer in diplopterous wasps than any of the other tropical parts of the world; this is especially striking if we note its large extension, its size being about twice that of either the Neotropical or Oriental regions. The total number of species and genera is much inferior to that of the Neotropical region and hardly equal to that of the Oriental. Only 29 genera have been recorded from the Ethiopian region and some of them, such as *Vespa*, *Elimus*, etc., are still of very doubtful occurrence. Seven of its genera are practically endemic: *Masariella*, *Paramischocyttarus*, *Ischnogasteroides*, *Pseudochilus*, *Synagris*, *Rhynchalastor*, and *Belonogaster*; a single species of *Belonogaster* reaches western India. The three best defined of these endemic types are *Paramischocyttarus*, *Synagris*, and *Belonogaster*; especially the two last named genera have numerous species, which are common and of large size; and they are, therefore, in no slight degree one of the characteristic features of the African fauna. A large number of Ethiopian genera are cosmopolitan or at least known also from the Palearctic region. *Zethus* is its only tropicopolitan type and is very poorly represented. The truly tropical genera of Africa do not show any affinities with the Neotropical region. Their nearest relatives are found in the Oriental region, a fact plainly shown by the distribution of such types as *Labus*, *Pareumenes*, *Polybioides*, and *Ropalidia* (Fig. 240). The numerous relations between the Oriental and Ethiopian faunae are further indicated by the range of some of the more common species of *Eumenes* [*E. maxillosus* (de Geer), Fig. 44; *E. caffer* (Linné), Fig. 56] and *Odynerus* [*O. hæmorrhoidalis* (Fabricius), p. 145]. This, I believe, will become more evident still as the true relationships of the numerous forms of these two genera are more thoroughly studied. However, the Oriental region possesses several types, such as *Stenogaster*, *Parapolybia*, *Vespa*, and *Provespa*, which do not occur in Africa. The many peculiar forms of the Australian continent find no allies among the Ethiopian wasps.

¹ The hymenopterous fauna of New Zealand as a whole is very poor.

So far as the distribution of the Vespidæ is concerned, there are no marked differences between the various subdivisions of the Ethiopian region. The Malagasy subregion is perhaps the best characterized, because *Synagris*, the most truly Ethiopian wasp type, is entirely absent there; it lacks also the Masarinæ, *Raphiglossa*, *Paramischocyttarus*, and *Polybioides*. Though it possesses no wasp genus of its own, it is exceptionally rich in species of *Belonogaster* and *Ropalidia*, some of which have a peculiar leaf-green color found nowhere else throughout the range of these genera. Some Oriental types, such as *Polistes macanensis* (Fabricius) and *Odynerus trilobus* (Fabricius), have reached Madagascar and the Seychelles, and perhaps are now settling on the east coast of Africa.

There is, among the Vespidæ, apparently no strictly Guinean or West African genus, although the range of many species or varieties coincides fairly well with that of Engler's Western Forest province, as I shall often have an opportunity of showing in the course of this paper. In Engler's Savannah province, the genus *Raphiglossa* (Fig. 1) extends over South and East Africa; several species of *Belonogaster* and *Synagris* have a similar distribution, or range even across the Sudan as far as Senegambia. The majority of the Ethiopian Masarinæ are found only south of the Orange River; however, they are not restricted to Engler's Southwestern Cape region, but occur throughout the central Karroo and even in Damaraland. It is worth mentioning that the strictly Ethiopian genera *Paramischocyttarus* (Fig. 6), *Synagris* (Fig. 226), and *Belonogaster* (Fig. 237) are absent from the southwestern part of the Cape Colony.

KEY TO THE GENERA OF VESPIDÆ, EXCEPT THE MASARINÆ, KNOWN TO OCCUR IN THE ETHIOPIAN REGION¹

1. Second and third cubital cells each receiving one of the recurrent nervures. Tarsal claws toothed; middle tibiæ with one apical spur. Mandibles short, 4-dentate. Antennæ ♀ 12-, ♂ 13-jointed, the terminal joint of the ♂ antennæ normal, not hook-like. Labium very long, protractile. Abdomen with the first segment very long and slender, petioliform.
Raphiglossa S. Saunders.
- Second cubital cell receiving both recurrent nervures.2.
2. Tarsal claws toothed beneath or bifid near the apex; in some cases nearly simple, the middle tibiæ then with one apical spur. Middle tibiæ with one or two apical spurs. Solitary species, with ♀ ♀ and ♂ ♂ only.3.

¹ The African Masarinæ can be recognized at once by their front wings, which have only two closed cubital cells; all the other African genera of diplopterous wasps have three closed cubital cells. The generic characters used in the present key will prove entirely correct for the known African species only, although in most cases they may be true also for species from other regions.

- Tarsal claws simple, edentate. Mandibles short, not grooved at their outer surface. Middle tibiae with two apical spurs. Social species, several ♀♀ living together and sometimes with a worker caste. 17.
3. Mandibles short, obliquely truncate at the apex, folded under the anterior part of the clypeus so as to cover partly each other. Middle tibiae with one or two apical spurs. First abdominal segment always much narrowed, petioliform. 4.
- Mandibles more or less elongate, beak-like or crossing each other in an X, always distinctly produced beneath the inferior margin of the clypeus. Middle tibiae with one apical spur. 8.
4. First abdominal segment very narrow and elongate, as is also the basal half of the second segment; the petiole thus produced is very slender and twice as long as head and thorax together. Antennae 12-jointed ♀, 13-jointed ♂, the terminal three joints of the ♂ antennae spirally rolled up. Middle tibiae with two apical spurs. *Paramischocyttarus* Magretti. (*Ischnogasteroides* Magretti, which I have not seen, seems to come near this genus).
- Abdominal petiole much shorter and not exceedingly slender, the second segment only narrowed over a short distance near its base, the total length of the petiole scarcely exceeding that of head and thorax. Terminal joint of ♂ antennae (so far as known in the African species) recurved, hook-like. 5.
5. First abdominal segment very narrow, forming a long and slender petiole, which is only slightly broadened posteriorly and is flattened or uniformly rounded on its dorsal face; second abdominal segment subsessile, scarcely necked. Second cubital cell triangular, strongly narrowed or more or less petiolate on the radius. *Labus* Saussure.
- Abdominal petiole differently shaped, the first abdominal segment swollen laterally or above in the middle, or the second segment with a distinctly narrowed basal neck. 6.
6. Basal quarter or fifth of the second abdominal segment narrowed into a neck. First abdominal segment much elongate, gradually swollen towards its middle, fusiform. Second cubital cell trapeziform, broadly open on the radius. *Zethus* Fabricius.
- Second abdominal segment scarcely or not narrowed into a neck at the base. . 7.
7. Abdominal petiole (first segment) long, depressed, gradually broadening from its base toward its apex, much as in *Eumenes*. *Paracumenes* Saussure.
- Abdominal petiole (first segment) narrow and slender at its base, strongly and abruptly swollen in its posterior half, club-shaped. *Elimus* Saussure. (The occurrence of this genus in Africa is doubtful).
8. Clypeus ending anteriorly in a distinctly pointed apex. Labial palpi 4-jointed, the terminal joint very small; maxillary palpi 6-jointed. Second cubital cell much narrowed or subpetiolate on the radius. Abdomen *Odynerus*-like, not narrowed into a petiole. *Rhynchalastor* Meade Waldo.
- Clypeus truncate or emarginate at its apex. 9.
9. First abdominal segment narrowed into a more or less elongate petiole, its apex at most half the width of the second segment. Labial palpi 4-jointed; maxillary palpi 6-jointed. 10.

- First abdominal segment not at all petiole-shaped, not or scarcely narrower than the second segment. As an exception, slightly petiolate at its base in *Montezumia*; in which case, the labial palpi are 3-jointed and the maxillary palpi 5-jointed. 12.
10. First abdominal tergite (petiole) with a transverse carina near its base, as in *Ancistrocerus*, funnel-shaped or subcampanulate, never very long and narrow. *Nortonia* Saussure.
Abdominal petiole without transverse carina on its dorsal face. 11.
11. First abdominal segment funnel-shaped or subcampanulate, with a very narrow short basal part and a much longer swollen terminal portion. The first segment never longer than the second, as a rule much shorter, a condition intermediate between *Eumenes* and *Odynerus*. *Pachymenes* Saussure.¹
First abdominal segment distinctly elongated into a petiole, which is as a rule very narrow and as long as or longer than the thorax or the second abdominal segment. *Eumenes* Latreille.
12. Second cubital cell distinctly petiolate. First abdominal segment without transverse suture. Terminal joint of ♂ antennæ hook-like. Scarcely different from *Odynerus*. *Alastor* Lepeletier.
Second cubital cell not petiolate, broadly open, narrowed, or closed on the radius. 13.
13. Maxillary palpi 5-jointed (often one or more of the terminal joints dropped off)²; labial palpi 3-jointed. 14.
Maxillary palpi 6-jointed; labial palpi 4-jointed, the basal joints heavy, the fourth joint often minute and scarcely visible. 15.
14. First abdominal segment funnel-shaped with a short narrow petiole at its base, very much as in *Pachymenes* from which this genus can only be separated on account of the palpi. Lateral angles of propodeum not projecting into heavy spines³. *Montezumia* Saussure.
Abdomen not at all narrowed into a petiole at its base. Large wasps. The lateral angles of the propodeum, as a rule, projecting into heavy strong spines. Joints of the labial palpi very long and slender; the fourth joint replaced by a long bristle². *Synagris* Latreille.
15. Labial palpi long; their joints flattened and ciliated with long hairs at their inner side in the ♀; in the ♂ feebly or not ciliated. *Pterochilus* Klug.
Labial palpi normal in both ♀ and ♂, neither flattened nor ciliated. 16.
16. First abdominal tergite with at least one distinct transverse carina or suture near its base or on its middle, sometimes with two carinæ. Last joint of antennæ in the ♂ folded back to form a hook. *Ancistrocerus* Wesmael.
First abdominal tergite without transverse carina or suture. Terminal joints of the ♂ antennæ rolled up in spiral fashion or the last joint hook-like.
Odynerus Latreille.

¹ *Pseudochilus* Saussure, with the single species *P. glabripalpis* (Saussure), comes apparently very close to *Pachymenes*. I have not seen that insect.

² In *Synagris vicaria* Stadelmann, the maxillary palpi are distinctly 6-jointed; the labial palpi, however, possess only three joints.

³ I have not seen African species of this genus.

17. Clypeus broadly truncate at the apex, which is often slightly sinuate in the middle and presents more or less projecting lateral edges. First tergite without narrowed petiole, vertically truncate at its base, its anterior sloping part forming a strong angle with its posterior portion. Hind wings without anal lobe. Antennæ, ♀, 12-jointed; ♂, 13-jointed; the terminal joints in the ♂ always simple. Maxillary palpi 6-jointed; labial palpi 4-jointed.

Vespa Linné.

Clypeus tapering anteriorly to a sharply or bluntly pointed apex, or broadly rounded, rarely broadly truncate over its whole width (in certain *Polistes* ♂ ♂). First tergite always distinctly rounded above, often with a narrowed petiole-shaped base. Hind wings with an anal lobe. 18.

18. Abdomen with its second segment much enlarged; the tergite and sternite of this segment nearly completely fused into a bell which includes the greater part of the posterior retracted segments. First segment much narrower than the second, more or less petiolate and narrowed at its base, swollen in its apical portion. Extensory muscle of the abdomen fixed on the propodeum in a narrowly compressed valvula. Antennæ and palpi much as in *Polistes*. *Ropalidia* Guérin.

Tergite and sternite of the second segment distinctly free from each other. . 19.

19. Extensory muscle of the abdomen inserted on the propodeum in a narrow and much compressed valvula between the apical scales of the propodeum. First segment shortly, or not at all, petiolate at its base. Antennæ 12-jointed, ♀; 13-jointed, ♂; the terminal joints in the ♂ simple or more or less spirally rolled up. Maxillary palpi 6-jointed; labial palpi 4-jointed.

Polistes Latreille.

Extensory muscle of the abdomen inserted on the propodeum in a broad and oval valvula between the apical scales of the propodeum, the opening of which is always rounded above. First segment distinctly narrowed into a petiole, at least at its base. Antennæ 11-jointed in the ♀, 12-jointed in the ♂. Maxillary palpi 5-jointed; labial palpi 3-jointed. 20.

20. Abdominal petiole very long and slender, including the whole of the much narrowed first segment and the basal portion of the second. Mesopleura without sutures subdividing the episterna or separating the epimera. Terminal joints of antennæ in the ♂ rolled up spirally. Large species, always over 15 mm. in total length. *Belonogaster* Saussure.

Abdominal petiole comparatively short, gradually widening towards its posterior half; second segment only short-necked, not forming a part of the petiole. Mesopleural suture and median episternal groove distinctly marked on the mesopleura. Terminal joints of the antennæ in the ♂ simple. Small species, never attaining 15 mm. in total length. . . . *Polybioides* R. du Buysson.

DESCRIPTIVE ACCOUNT OF THE VESPIDÆ OF THE
BELGIAN CONGO

RAPHIGLOSSINÆ

Raphiglossa S. Saunders

Four species have been recorded from the Ethiopian part of Africa; but some of them are apparently very closely related, if not identical.

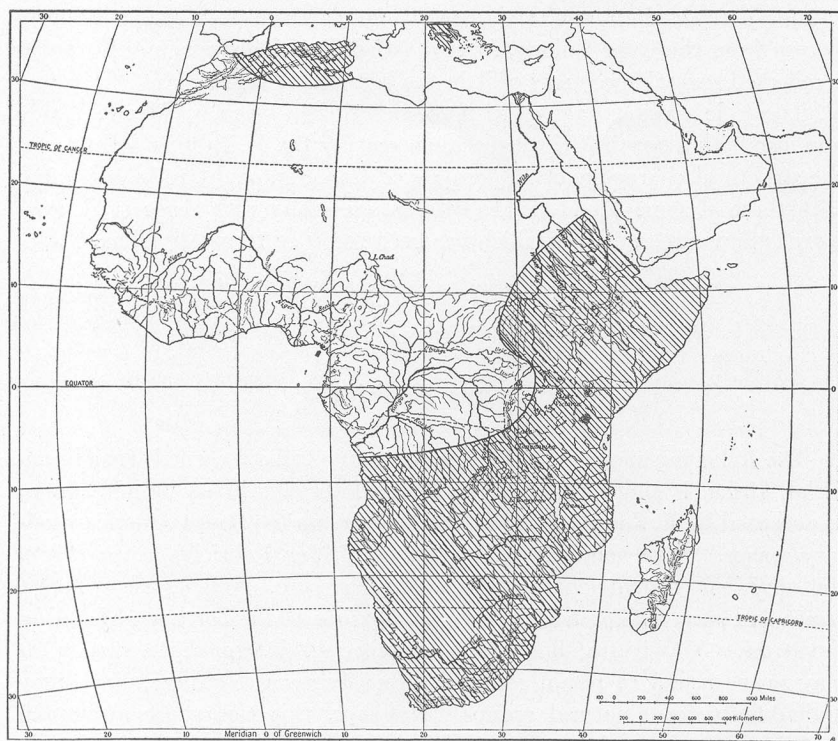


Fig. 1. Distribution of the genus *Raphiglossa*.

They are restricted to the savannah and steppe regions and are always scarce. Fig. 1 shows the distribution of the genus so far as known.

Ethology. *R. flavo-ornata* P. Cameron was bred in South Africa by

H. Brauns.¹ It excavates its cells in dry stems which have soft pulp, chiefly Liliaceæ, and makes simple partitions, provisioning its larvæ with small caterpillars; each imago escapes from the cell through the wall. In the Mediterranean subregion *R. eumenoides* Saunders nests in briars,² and *R. zethoides* Saussure in reeds³; both fill their cells with small beetle larvæ (Curculionidæ); in order to escape, the perfect insect gnaws a circular aperture through the side of the briar or reed.

1. *Raphiglossa flavo-ornata* P. Cameron

Belgian Congo.—A single female of this very interesting wasp was collected by Messrs. Lang and Chapin at Faradje, Uele, December 1912. This capture extends the range of the species far northward; it was previously known from the Cape Colony, Angola, North East Rhodesia, and Katanga; I collected several specimens of it in the last named region.

The Uele specimen agrees with the description given by Meade Waldo and also with a South African specimen sent by Dr. H. Brauns. However, the structural characters of *R. flavo-ornata* Cameron ought to be compared with those of some Mediterranean forms, especially with those of *R. symmorpha* Saussure, a species which has been recorded from Abyssinia.

ZETHINÆ

Zethus Fabricius

The following species, the first of the genus to be recorded from Equatorial Africa, is simply referred to *Zethus* Fabricius in its broader sense, as accepted by E. Zavattari in his latest papers on the South American solitary wasps.⁴ The genus includes, besides *Zethus* Fabricius *sensu stricto*, the divisions or subgenera *Zethusculus* Saussure, *Didymogastra* Perty, *Heros* Saussure, *Calligaster* Saussure, *Wettsteinia* Dalla Torre, and *Laboides* Zavattari. Notwithstanding the occurrence of intermediate species, it may prove useful to retain some of these divisions as genera, since they undoubtedly form natural groups. However, this cannot be attempted at the present time, because none of these groups have been thoroughly characterized. It is, indeed, very difficult to decide in which of these sections the African species must be placed.

¹ G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 45.

² S. S. Saunders, Trans. Ent. Soc. London, (2), I, 3, 1850, pp. 72-74; idem, 1873, pp. 407-410.

³ Fertou, Ann. Soc. ent. France, LXXX, (1911), 3, 1912, pp. 383-387.

⁴ Arch. f. Naturgesch., LXXVIII, Abt. A, Heft 4, 1912, p. 8.

A. v. Schulthess refers his *Z. delagoensis* to the subgenus *Calligaster*. This group was originally described as a genus by H. de Saussure¹ and included the two species, *C. cyanoptera* Saussure and *C. hero* Saussure; both were later on brought in *Zethus*, although in different divisions: *Zethus cyanopterus* Saussure in the division *Calligaster*, and *Zethus gigas* Spinola (= *Calligaster hero* Saussure) in the division *Heros* Saussure.² Neither of these two species seems to be closely related to the African *Zethus*. In both of them the second abdominal segment is only very short-necked at the base, and the shape of the abdominal petiole, too, is distinctly different. I believe that, owing to the short, but nevertheless well defined, neck of the second abdominal segment and to the regularly fusiform petiole, the African *Z. delagoensis* A. v. Schulthess and *Z. rodhaini* may best be compared with the American *Zethusculus* (type: *Zethus jurinei* Saussure), though it seems hazardous to include them definitely in that group. In some of the American *Zethusculus* the antennæ are spirally rolled up at the apex, whereas in others they end in a hook-like joint. In the male of *Z. delagoensis* the terminal joint of the flagellum is hook-like and folded underneath the preceding joints; the two African species have two terminal spurs on the middle tibiæ, whereas, according to Zavattari, this number is variable among the American *Zethusculus*.

Ethology. Although the species of *Zethus* in the broad sense are, so far as known, solitary wasps, the study of their habits is one of the most interesting chapters of insect ethology, because some of them are apparently in actual evolution toward the conditions of social life.

Ashmead³ records that he has frequently taken the mud cells of *Zethus spinipes* Say from the twigs of the Iron Tree in Florida. But I could not discover any other record of the habits of this North American species.

The nest of the South American *Zethus (Didymogastra) romandinus* (Saussure) was described and figured by H. de Saussure⁴: it forms a lump in which several rounded cells of a black color are irregularly united, the form of each cell recalling slightly that of *Bombus*; the walls, thickened toward the bottom, are made of a mixture of wood fibre and a gummy material. H. O. Forbes⁵ figures the very remarkable nest of *Calligaster cyanoptera* Saussure, from Java and writes with regard to it: "A colony of these bees had covered the stems of a species of *Asclepias*, overgrowing

¹ Et. fam. Vesp., I, Eum., 1852, p. 22.

² Et. fam. Vesp., III, Suppl., 1854, p. 115.

³ Psyche, VII, 1894, p. 77.

⁴ Et. fam. Vesp., I, Eum., 1852, p. 20; Pl. ix, fig. 1c. Smithsonian Miscell. Coll., XIV, No. 254, 1875, p. 47.

⁵ A Naturalist's Wanderings in the Eastern Archipelago, 1885, p. 73.

the face of a high cliff; and it took a sharp eye to distinguish their nests from clusters of the weathered leaves of the climber. Composed of chips of leaves glued together, they were protected from the rain by a projecting roof, which for the purpose of concealment was cunningly shaped like the foliage of the plant itself. There was quite a crowd of them." This seems to indicate the existence of communistic instincts in this species.

Much more complete are the observations of A. Ducke¹ on some Brazilian species. According to this excellent student of tropical wasps, the female of the large-sized *Zethus mexicanus* (Linné) nests singly after the usual manner of other solitary wasps, using holes in dry wood; the substance of the partitions is green and made of malaxated pieces of leaves. Apparently in all the smaller species of the subgenera *Zethusculus* and *Didymogastra*, however, several fertile females work together on the same nest. The nest of *Zethusculus lobulatus* (Saussure) consists of nearly cylindrical cells fixed on a vine and opening on either of two opposite sides. The walls are made of pieces of leaves, which are irregularly circular, 1 to 1.5 mm. in diameter, and apparently strongly worked all over with the mandibles; they are pasted together with a resinous substance. The freshly made cells are green and soft, but after a few days they turn dark brown and become very hard. As soon as the cell is half completed, the mother wasp lays an egg in the bottom and then continues to build the walls of the cell. About the time these are finished, the egg hatches and the mother wasp then feeds the larva, from day to day, with small paralyzed caterpillars, bringing in larger ones as the larva increases in size. The cell is closed by the mother, above the full-grown larva, with the same mixture of pieces of malaxated leaves and resin, but the resin is predominant. Such a nest is nearly always constructed by several fertile females, as many as a dozen, but this association is evidently nothing more than a colony. Ducke once observed how two females started their nests at a short distance from each other; through further addition of cells the two nests became fused into a single one. Both females and males are found on the larger nests, and a part at least of the newly emerged females remain true to their old nest and add supplementary cells to it. At night or during the rain, the building female sits in the open cell, with the egg or larva; the male hides in a similar manner in some old, empty cell. *Didymogastra geniculata* (Spinola) builds oval, transversely striate cells very similar to those figured by H. de Saussure for *D. romandina*; the very hard walls are probably of the same material as those of *Z. lobulatus*. Similar nests are also built by a fourth species. The use of vegetable fibre in building the nest, the nursing of the larva from

¹ Zool. Jahrb. Abt. f. Syst., XXXVI, 1914, pp. 308, 320, and 325-326, fig. R.

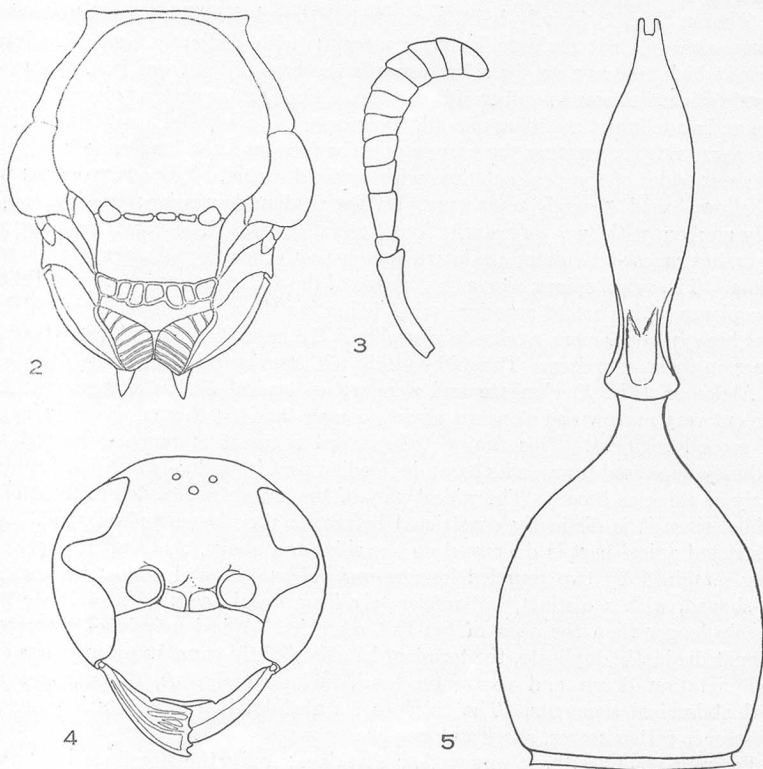
day to day, and the gathering of several females on a single construction are so many interesting ethological facts, evidently showing an evolution towards social habits. However, it must be noted that, even in these cases, each of the females cares only for its own offspring.

Nothing is known with regard to the habits of any of the African species.

2. *Zethus rodhaini*, new species

Plate I, Figure 5

♀.—Head subcircular (Fig. 4); slightly broader than high. Clypeus transverse; one and a half times as broad as high; its anterior margin broadly truncate; its apex measures about one third of the total width of the clypeus and terminates on each side in a short projecting edge; these projecting edges are united through a



Figs. 2-5. *Zethus rodhaini*, new species.

Fig. 2. Thorax from above, ♀. Fig. 3. Antenna, ♀. Fig. 4. Head in front, ♀. Fig. 5. First and second tergites from above, ♀.

narrow depressed margin. Mandibles broad and short; of the *Zethus* type; their apices broadly truncate, with four rounded teeth, covering each other on the middle line; their outer surface with a strong continuous longitudinal, median ridge, and a number of irregular grooves. Maxillary palpi 6-jointed, their three terminal joints long and slender; labial palpi distinctly 4-jointed, their fourth joint very short but well developed. Front between the insertion of the antennæ with a distinct transverse ridge; below this, two deep and broad grooves separated by a median frontal carina; antennal pits margined on their inner half by a strong erected crest. Vertex well developed, distinctly margined behind, without fovea; posterior ocelli slightly farther from the inner margin of the eyes than from each other, distinctly farther from the hind margin of the vertex. Temples very broad, as wide as the eyes seen in profile, strongly and sharply margined, obliquely truncate at their lower end; at the edge between its vertical and horizontal part, the raised margin is produced in a strong tooth. Antennæ (Fig. 3) short and thick; the flagellum very strongly swollen; the third antennal joint one and one-half times the length of the fourth; most of the following joints much broader than long and distinctly shortened towards the under side.

Thorax (Fig. 2) heavily built, somewhat flattened dorsally. Pronotum with a sharp, although not carinate, anterior margin; with distinctly projecting lateral angles which continue on the sides, towards the base of the front legs, as strongly raised carinæ. A small number of broad excavations on the suture between mesonotum and scutellum. Scutellum broad, transverse. Postscutellum with an irregular, transverse ridge separating the narrow anterior face from the longer, oblique posterior face; sides of the postscutellum with a raised carina. Propodeum short, with a shallow, broad, strongly transversely striate, median depression; its sides moderately swollen, with two very strong longitudinal carinæ. The dorsal area between the carinæ rugose-reticulate; the lateral area beneath the external carina transversely striate. The apical spines, above the valvula of the abdomen, very heavy and sharp. Mesopleura with a raised anterior carina delimiting the epicnemialia of the front legs. Legs heavy; the femora moderately swollen. Tibiæ with a row of 8 to 10 strong spines on their outer face. The middle tibiæ with two apical spurs.

Abdomen (Fig. 5) elongate and slender; of typical *Zethus* shape. The first segment very narrow and elongate, slightly longer than the thorax, about as long as the second segment. This first petiole-shaped segment is much narrowed and gradually depressed towards its base; its median part is gradually swollen, fusiform, nearly as thick as broad. The widest part of the petiole is situated in front of its middle, since it is distinctly constricted before its slightly expanding apex. This constricted apical part is depressed on the sides and above, the median depression being margined by two rounded longitudinal ridges. Second abdominal segment bell-shaped, with a distinct, but moderately long, basal neck; this petiolate base scarcely longer than the apex of the first segment. Apical margin of the second segment distinctly duplicate, the terminal lamella slightly curved upward at its end.

Punctuation dense and coarse on head, including clypeus, thorax, and two basal abdominal segments. The third to sixth abdominal segments impunctate. Pubescence rather scarce, short and grayish.

Entirely black, without any yellow markings; only the flagellum beneath is slightly ferruginous. Wings feebly infusate.

Length (h. + th. + t. 1 + 2), 14 mm.

♂ unknown.

Belgian Congo.—One female from Walikale, January 10, 1915, in the eastern Congo forest (J. Bequaert Coll.).

This species is evidently related to *Zethus delagoensis* A. v. Schulthess (= *Discælius transvaalensis* Bingham), coming in the same subgenus. It is, however, easily recognized by the different shape and sculpture of the post-scutellum and propodeum. In *Z. delagoensis*, of which I have been able to study one male and two females from Delagoa Bay, the postscutellum is flattened and oblique, with feeble punctures; the propodeum has no longitudinal carinæ, but its sides are broadly rounded; also, this species presents much richer ferruginous markings.

Paramischocyttarus Magretti

Magretti has placed this genus near *Mischocyttarus* Saussure, and Meade Waldo compares it with *Stenogaster* Guérin. Ashmead locates it in his social wasps or Vespidae, next to *Mischocyttarus* Saussure.¹ However, observations, which I made a few years ago in the Katanga, show that the habits of *Paramischocyttarus* are those of a true solitary wasp and this leads us to review, on its morphological features, the real affinities of the genus. The following are its most important characters:

Clypeus transverse, emarginate at the apex, ending in two small lateral teeth. Mandibles short, grooved on the outer side, obliquely truncate and tridentate at the apex in the male, quadridentate in the female. Antennæ 12-jointed in the female, 13-jointed in the male; in the latter sex the three terminal joints are flattened and spirally rolled up. Middle tibiæ with two distinct, strong, terminal spurs. Claws of the tarsi bifid at the apex.

The mouth parts (Figs. 8 and 9) are very similar to those of *Zethus*² and *Elimus*³; they are comparatively elongate and extensible. Mentum short and broad; ligula elongate, shortly bifid at the apex, slightly hairy on the middle part; paraglossæ long and slender, scarcely thickened at their apex. Labial palpi elongate, 4-jointed; their basal joint very long, strongly curved, slender at its base, thickened at its apex; second joint short and thick; the third and fourth elongate and narrow, both very distinct. Maxillæ elongate; the lacinia longer than the stipes. Maxillary palpi 6-jointed; elongate; their first joint thickened; their first and second almost of equal length; their third much longer and narrow; their three terminal joints very distinct, almost of equal length, long and slender.

The shape of the abdomen is very peculiar and striking; however, it is only an exaggeration of what is seen in *Zethus*, a genus to which *Paramischo-*

¹ Canadian Entom., XXXIV, 1902, p. 166. Curiously enough Ashmead makes, with *Stenogaster* Guérin and *Ischnogasteroides* Magretti, the subfamily Ischnogasterinæ, which he places in his solitary Eumenidæ (*op. cit.*, pp. 204-205).

² H. de Saussure, Et. fam. Vesp., I, Eum., 1852, Pl. II, fig. 3.

³ Saussure, idem, Pl. III, fig. 1.

cyttarus is in my opinion so closely related that certain neotropical species of the subgenus *Didymogastra* Perty can hardly be separated from it. The abdominal petiole consists of the whole of the first and the basal half of the second segment; it is much longer than head and thorax together, very narrow and slender.

Stenogaster Guérin differs, *inter alia*, in the structure of the thorax and the elongated, beak-like mandibles, which are smooth on the outer side. The clypeus is narrowed and ends in a strongly pointed apex. The antennæ of the male have their terminal joint recurved so as to form a hook. The wing venation is very peculiar and built on a plan very different from that of other diplopterous wasps. *Mischocyttarus* Saussure is, if possible, still more dissimilar, not only in the general shape of the body, which reminds one of *Belonogaster* Saussure, but also in the following important features: clypeus pointed at the apex; antennæ of the male simple, their terminal joint normal, conical; middle and hind legs with the third and fourth joints of the tarsi elongate, lobate at their inner side; tarsal claws simple, edentate. The wing venation also appears to present many differences.

The genus *Ischnogasteroides* Magretti is undoubtedly closely related to *Paramischocyttarus*, and I was even inclined to unite it with the latter. However, only the female is known and, since I have seen no specimens of it, I must leave the question unsettled. According to the published description, the clypeus is convex, prolonged anteriorly, and arcuate so as to end in two sharp, divergent teeth. The tarsal claws are bifid.¹ The wing venation is similar to that of *Paramischocyttarus* and the shape of the abdomen is somewhat intermediate between that of this genus and of *Zethus*. The chief differences seem to lie in the presence of only one terminal spur on the middle tibiæ¹ and in the shape of the mandibles which are described as narrow and long, beak-like. The habits of *Ischnogasteroides* are unknown.

Paramischocyttarus is restricted to the Ethiopian region, its distribution so far as known being shown in Fig. 6. Three species have been described, but I believe later observations will prove that they are synonymous. All the specimens I have seen from the Belgian Congo belong to one species, and they agree best with the very short description of *P. buyssoni* Gribodo. From this, *P. lacuum* Stadelmann differs chiefly in the tegulæ being "strohgelb," whereas in *P. buyssoni* they are "rufo-ferruginæ." In both these species the hind femora are rather normal, whereas in *P. subtilis* Magretti (= *Tanyzethus africanus* Cameron) they are, according to the figure,²

¹ The shape of the tarsal claws and the number of tibial spurs were fixed on the type specimen by Magretti, according to G. Meade Waldo, Ann. Mag. Nat. Hist., (8) XI, 1913, p. 54.

² Ann. Mus. civ. Genova, XXI, 1884, p. 602.

somewhat clavate; in *P. subtilis*, also, the tegulæ and two spots on the scutellum are described as "flavostramineæ."

Ethology. Since nothing is recorded on the habits of *Paramischocyttarus*, I might mention a few observations made some years ago on a wasp of this genus which cannot be identified at present, the specimens not being available. However, it is probable that the species in question was *P. buyssoni* Gribodo.

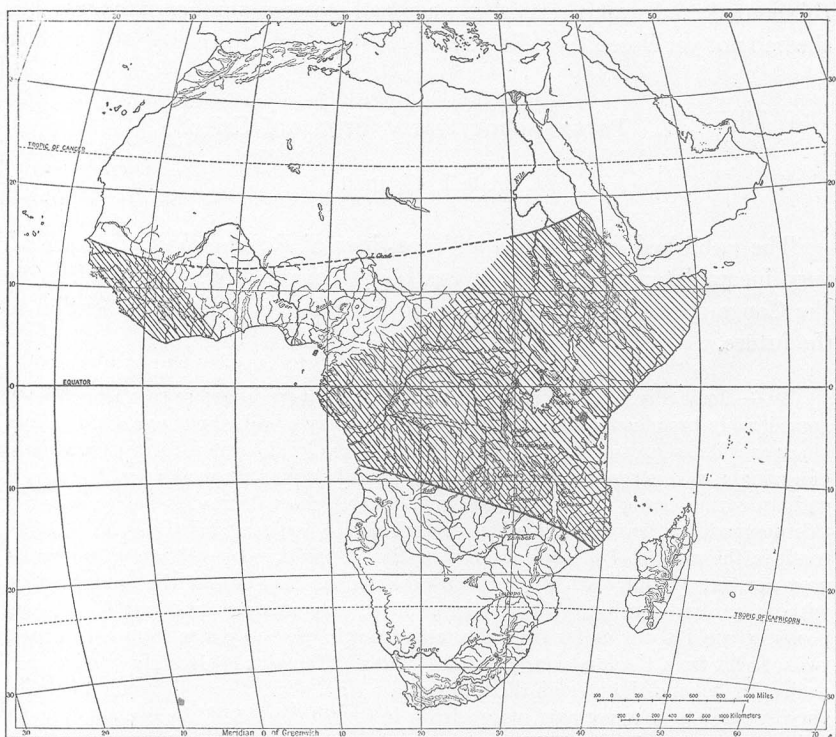


Fig. 6. Distribution of the genus *Paramischocyttarus*.

The nest of this wasp was found, at Bukama (Katanga, southeastern Belgian Congo, July 1911), in the hollow pith channel of a dry stick in the thatched roof of a house. The female apparently did not excavate the pith herself, nor did she remove the remains of pith along the walls. She built a transverse partition of clay at about 10 cm. from the entrance. The first cell in front of this clay partition was the only complete one of the nest;

it was about 10 mm. long, the pith channel having a diameter of 4.5 mm., and was filled with a large number of small spiders belonging to different species. The spiders were not dead but merely paralyzed. The egg which was found in this cell was cylindrical, elongate, and rounded at both apices; it was not fixed by a thread to the roof of the cell, as is usual among solitary diplopterous wasps, but simply attached to the body of one of the spiders. This first cell was closed by another transverse mud wall, which was convex and rugose behind, concave and smooth on its anterior face. In front of this second mud wall, the mother wasp had stored a number of spiders, but she had not yet closed the cell itself.

3. *Paramischocyttarus buyssoni* Gribodo

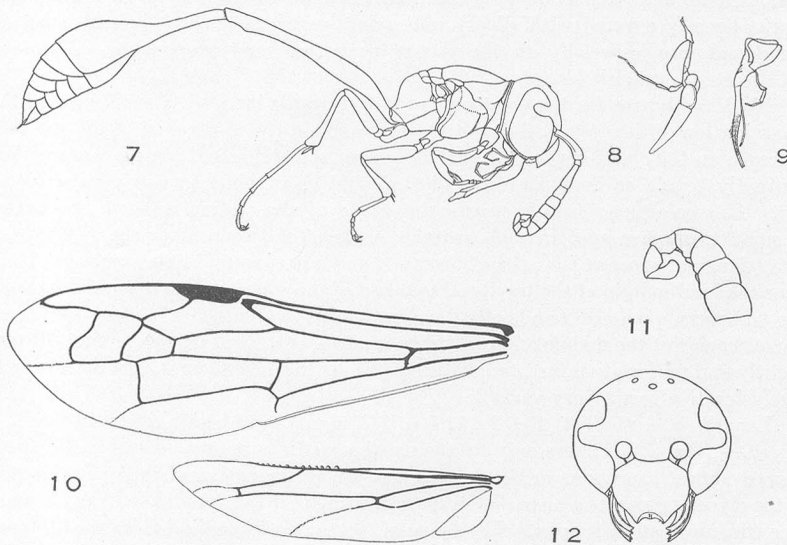
Plate I, Figure 1

The published descriptions and drawings of *Paramischocyttarus* are all very incomplete; accordingly it has been thought advisable to redescribe the Congo species in detail in order to facilitate its exact identification in the future.

♀.—Head (Fig. 12) almost subcircular in front; very large; as seen from above, considerably broader than the thorax. Clypeus very broad, about one and one-half times as wide as long on the middle line; its broad apical margin feebly but distinctly emarginate, with strongly projecting, acute lateral angles; its surface feebly convex, without carinæ but with a transverse, well-defined, short depression before its apex; this depression often with a median tubercle which projects slightly as an obsolete tooth in the middle of the apical emargination of the clypeus. Oculo-malar spaces very narrow. Front distinctly swollen between the insertion of the antennæ, but without carina or ridge. Vertex also swollen, very elongate, without fovea; the posterior ocelli about as far from the inner margin of the eyes as from each other, twice as far from the hind margin of the vertex. Temples moderately swollen, not projecting beyond the eyes on the head as seen from above; seen in profile, they are very broad in their upper part, very narrow in their inferior half, the transition being sudden and producing a sharp posterior angle. Temples and vertex margined behind by a very sharp and high carina. Mandibles very broad and short; their apex broadly truncate with four strong triangular teeth almost of equal size. The mandibles are folded above each other underneath the clypeus, so as to be almost completely hidden from sight when closed. Antennæ short and heavily built; the flagellum moderately swollen; the third antennal joint nearly as long as the fourth and fifth together; joints 4 to 11 broader than long; the apical joint much longer than broad.

Thorax elongate and narrow. Pronotum long; only slightly narrowed towards its anterior margin, which is broadly truncate and raised into a short, sharp carina; its lateral angles rounded, scarcely projecting. Mesonotum distinctly longer than broad, with two feeble and very short traces of parapsidal furrows in front of the

scutellar suture on the middle line. Scutellum comparatively short and broad, scarcely twice as long as the postscutellum; flat; without carinæ or teeth. Postscutellum very short; transverse; entirely horizontal; flat; without ridge, carina, or tooth. Mesopleura with a sharp vertical carina limiting the epinemia of the front legs, and with lines of deep punctures indicating the limits of the epimera and a division of the episterna into an upper and a lower plate. Propodeum comparatively long and strongly convex, with a very long horizontal face behind the postscutellum on the middle line, very broadly rounded towards its posterior slope; this hind part is not excavated in the middle, but presents only a narrow longitudinal groove which ends in a deep hollow above the articulation of the abdomen. Propodeum without carinæ or projecting angles of any kind; the valvula at the articulation of the abdo-



Figs. 7-12. *Paramischocyttarus buyssoni* Gribodo.

Fig. 7. Body in profile, ♂. Fig. 8. Maxilla and maxillary palpus, ♀. Fig. 9. Labium and labial palpus, ♀. Fig. 10. Venation of wing, ♀. Fig. 11. Terminal joints of antenna, ♂. Fig. 12. Head in front, ♀.

men raised in two minute, but very sharp teeth. Legs, as compared with the abdomen, short, but rather thick, especially the middle and hind tibiae which are inflated towards the apex. Hind tarsi elongate, slender; hind coxæ with a sharp ridge, but without tooth on their upper face; hind tibiae without spines on their outer side. Middle tibiae with two apical spurs. Claws deeply bifid before the apex.

Wing venation (Fig. 10) of the ordinary *Zethus* type and apparently variable. The first discoidal cell extraordinarily long and narrow, as is usual in the *Zethinæ*; its apex vertically truncate; the first recurrent nervure running almost in a straight line with the inferior margin of the second cubital cell. The second cubital cell distinctly triangular, much narrowed, sessile or shortly petiolate on the radius. The discoideus starts about the middle of the nervulus.

Abdomen extremely elongate and slender; its total length two and one-half times that of head and thorax; the terminal segments are usually not telescoped within the second. First segment very long and narrow, longer than head and thorax together, only very feebly curved in profile; seen from above, its sides are subparallel, the tergite being faintly widened in its basal half and at its apex; its apical angles, however, not projecting at all. Second segment strongly narrowed over its basal half into a long, petiole-shaped neck, which is even narrower than the first tergite; its terminal half gradually swollen behind.

Punctuation uniformly coarse and dense on head and thorax, including the clypeus and the propodeum; the punctures more remote on the mesopleura; the ventral lateral areas of the propodeum with a few transverse striae; the surface of the antennal scape also punctured in front. Tegulae impunctate, smooth, and shining. Abdomen impunctate, moderately shining, microscopically chagrined. Head and thorax densely covered with silvery pubescence which becomes long and hairy on the dorsal face, especially on the vertex, pronotum, and propodeum. Abdomen with a feeble, grayish bloom.

Black. Clypeus for the most part or only towards its apex, a small spot in the emargination of the eyes, and another, larger one, on the upper part of the temples, antennae on their under side, the ventral face of the abdominal petiole more or less distinctly, tegulae and valvula of the thorax, and legs are almost entirely ferruginous-red. This color may invade nearly the whole of the petiole in some specimens. A small transverse spot in each anterior angle of the pronotum, the posttegulae, two triangular spots at the apex of tergite 1, and a narrow undulate transverse band near the hind margin of the tergites 2 to 6 and of the sternites 4 to 6, whitish-yellow; the transverse preapical bands often interrupted in the middle. In some specimens the outer side of the middle and hind tibiae is also spotted with straw-yellow. Wings slightly and uniformly infuscated, with purplish effulgence, their stigma dark brown. The coloration is not very variable.

Length (h. + th. + t. 1 + 2), 11.5 to 14.5 mm. (total length up to 16 mm.).

♂.—(Fig. 7.) Differs only by the usual sexual characters. Head and clypeus shaped almost exactly as in the female, but the emargination of the apical margin of the clypeus presents a more distinctly projecting tooth on its middle line. Mandibles tridentate at their apex. The shape of the three terminal joints of the antennae is very peculiar and is similar to what is known for *Belonogaster* males. It is very different from that of the other Zethinae with antennae spirally rolled up in the male, such as *Zethus mexicanus* (Linné). Antennae comparatively elongate, distinctly swollen towards the middle of the flagellum; their third joint about as long as the fourth and fifth together; joints 8, 9, and 10 have a short tubercle at the under side; joints 11, 12, and 13 are much flattened, of about the same length and as a rule spirally rolled up (Fig. 11); joints 11 and 12 are distinctly dilated in their middle beneath; the thirteenth joint is broadly spatulate at its apex. Tarsal claws not so deeply bifid as in the ♀.

The coloration also similar to that of the ♀: the clypeus is nearly entirely yellowish white; there is a stripe of the same color on the under side of the antennal scape and at the outside of the hind tibiae. The four terminal joints of the flagellum testaceous, the terminal joint black at the apex.

Length (h. + th. + t. 1 + 2), 13 to 15 mm.

Belgian Congo.—Apparently one of the common wasps, often found on the flowers of *Bidens pilosa* Linné. I have seen specimens from Banana,

Sept. 1915, 9 ♂♂ and 4 ♀♀; Zambi, June 1915, 3 ♂♂ and 7 ♀♀; Boma, June 1915, 2 ♂♂ and 1 ♀; Matadi, June 1915, 1 ♂; Thysville, June 1915, 1 ♂ and 1 ♀; and Garamba, June 1912, 1 ♂ (Lang and Chapin Coll.); also Boswenda, 1900 m., October 1914, 1 ♀ (J. Bequaert Coll.).

Labus H. de Saussure

In 1867 H. de Saussure described as *Labus* a genus of solitary wasps which has since received many different interpretations. It is, therefore, necessary to go back to the original diagnosis in order to decide which species really belong here. Saussure's generic diagnosis is as follows:

Mandibles short and truncate; their apex, but not their inner margin, dentate; folded horizontally close to the clypeus, forming a very short beak. Maxillæ subelongate, with 6-jointed palpi. Labium subelongate, with 4-jointed palpi. Pronotum small, broad, with tooth-like anterior angles, narrowed and emarginate behind. Legs slender; tarsi elongate, their first joint the longest. Wings normal, Second cubital cell not petiolate, but angularly narrowed towards the radial cell, projecting and truncate towards the base of the wing, receiving both recurrent nervures, the first recurrent nervure being the continuation of the under margin of the second cubital cell. Radial cell broad, truncate or bluntly rounded at its apex. Abdomen with a very long petiole, which is linear, only slightly dilated at its apex.¹

H. de Saussure adds, furthermore, that this well-defined type belongs to his group of the Zethites, characterized by the short mandibles, which are not long enough to form a beak and which consequently fold horizontally above each other behind the anterior margin of the clypeus. This genus, he says, comes nearest to *Elimus* of which it may be considered a subgenus, according to the structure of its mouth parts. However, the shape of the body is very different and gives it a peculiar appearance. It further differs in: (1) The thorax, which is small, broad, strongly toothed anteriorly, not rather attenuated as is the case in *Elimus*; much narrowed and nearly pointed posteriorly. (2) The abdominal petiole, which is very narrow, not swollen into a tubercle in its middle or on its upper side, and only slightly widened towards its apex. (3) The legs, which are much more slender. This and the shape of the clypeus bring this genus somewhat near certain social wasps, such as *Polybia* (in the old, broad sense, as used by de Saussure), though the clypeus is not pointed nor angulate but somewhat rounded at its anterior margin. (4) The venation of the front wings, which is very peculiar. The radial cell is broad, truncate or blunt at its apex; the second cubital cell ends in a sharp angle on the radial cell; the second intercubitus

¹ Reise der Novara, Zool., II, 1, Hym., 1867, p. 3.

is slightly, and the first intercubitus very sharply, oblique — as a result, the second cubital cell is elongate towards the base of the wing, the internal angle thus formed being, however, truncate. The inferior margin of the second cubital cell is the prolongation of the first recurrent nervure, running in exactly the same direction. The inferior inner angle of the second cubital cell is closed by a small cross vein which descends vertically from the first intercubitus on the first recurrent nervure. The first intercubitus is so oblique as to form the prolongation of the inferior margin of the first cubital cell. Third cubital cell large, rectangular, somewhat widened towards its apical border.

Two species were originally included in the genus: *L. spiniger* Saussure, from Java, and *L. humbertianus* Saussure, from India; but a genotype was not designated.¹ The essential characters were shown on Plate I, Figs. 1 and 2, by good drawings. From the description of *Labus humbertianus* it appears, furthermore, that, in the male, the terminal joint of the antennæ is recurved into a hook.

Unfortunately, H. de Saussure very soon modified entirely his first view as regards this genus. In his Synopsis of American Wasps,² we find a much shorter diagnosis which retains only: the short, obliquely truncate mandibles, with 3 or 4 terminal teeth; the 6-jointed, elongate maxillary and 4-jointed labial palpi; the rounded, inflated head; the rounded or truncate clypeus; the elongate thorax, which ends anteriorly in sharp lateral angles; the very slender abdomen, with its elongate, linear petiole. As to the wing venation, the author merely says: "Wings somewhat as in *Eumenes* and *Zethus*." These changes were apparently brought about by the discovery of a new wasp from Chile, which was described as *Labus sichelianus*. However, in the same paper H. de Saussure divided *Labus* into two groups: the first to include *Labus spiniger* and *L. humbertianus*; the second, *L. sichelianus*. He adds in a footnote: "The genus *Elimus* would make a third type."

In his later work on the Hymenoptera of Madagascar, the same writer apparently returned to his original idea concerning this genus.³ This can be seen from the generic characters given and still better from the synopsis of the species known to him, in which we find only *L. spiniger* and *L. humbertianus*, besides the new Malagassan form, *L. floricola*. The last named species is evidently very closely related to the two others.

¹ The genotype was designated by Bingham as *L. spiniger* Saussure (Fauna Brit. India, Hym., I, 1897, p. 348). The same author contributed a good description and figure of *L. humbertianus* Saussure (idem, pp. 348-349, fig. 100).

² Smithsonian Miscell. Coll., No. 254, 1875, p. 56.

³ In Grandidier, Hist. de Madagascar, XX, Hym., 1890, pp. 149-151, Pl. xxii, fig. 3.

Moreover, H. de Saussure does not mention *Labus sichelianus*¹ in this paper.

In 1891 Gribodo proposed a new genus, *Stroudia*, for a South African species, *S. armata* Gribodo.² From his description it appears that this cannot be separated from *Labus* Saussure in its original sense. This was pointed out by F. Kohl,³ who has contributed descriptions of many African species, true representatives of *Labus* Saussure, and also an excellent review of the species of the genus known to him.

H. de Saussure described, half a century ago, under the name *Smithia*,⁴ a type of solitary wasps of which apparently very little is known at present. The generic diagnosis is very incomplete:

This type appears to be closely related to the genus *Elimus*; I cannot, however, describe it completely, since I was unable to make a dissection of the mouth parts. Head large, inflated, the antennæ inserted below its middle. Thorax much elongate; metathorax (= propodeum) elongate behind, narrowed, notched posteriorly. Abdomen with a long peduncle; the linear petiole as long as the thorax; the rest of the abdomen piriform. Second cubital cell petiolate, receiving both recurrent nervures; its posterior margin (= inferior margin) broken, the first recurrent nervure ending at this angular bend. This genus will be easily known; as soon as one has recognized a vespid by the shape of the prothorax which extends to near the wings and by the other characters of the family, the peculiar wing venation and the shape of the abdomen will be sufficient to distinguish it from all other genera of Eumeninæ.

So far as can be judged from this diagnosis and from the morphological details given in the description of the species, *S. natalensis* Saussure, this type is evidently very similar to *Labus* Saussure, the only difference being the petiolate second cubital cell.

I received lately from Dr. H. Brauns two females of the South African *Smithia natalensis*. In one of them, the second cubital cell is, in both wings, closed exactly on the radius, but cannot be said to be petiolate; in the other specimen, this cell is very shortly petiolate on the left side, more distinctly so in the right wing. There is no further difference of generic value between these little wasps and the true *Labus*.

While collecting Hymenoptera in the Congo, my attention was frequently drawn to some apparently common, small solitary wasps, presenting a

¹ I have seen a specimen of *L. sichelianus* Saussure, in the collection of the U. S. National Museum, in Washington. It was classified as *Discelius* by Ashmead, apparently because of the presence of two apical spurs on the middle tibiæ. The species is closely allied to *Zethus* Fabricius in its broader sense, and can best be located in a group of its own, *Laboides*, as was suggested by Zavattari (Arch. f. Naturg., LXXVIII, Abt. A, Heft 4, 1912, p. 65); it is certainly very different from the Old World *Labus*.

² Bull. Soc. ent. Italiana, XXIII, 1891, p. 264.

³ Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 249.

⁴ Revue et Mag. de Zoologie, (2), VII, 1855, p. 371.

distinctly petiolate second cubital cell. However, together with these were taken other specimens very much like the preceding in shape, structural characters, and sculpture, except for the wing venation, in which the second cubital cell was open, although very strongly narrowed on the radial cell. In some cases, apart from these differences in the venation, no structural characters could be detected which would enable one to separate the two specimens as distinct species. A comparative study of these Congo wasps and of *Smithia natalensis* brought me to the conclusion that they all belong to the same generic type; the character of the open or petiolate second cubital cell cannot be given generic value among them, it being variable even within the limits of the same species. I have no doubt that they must be referred to de Saussure's genus *Labus*. The name *Smithia* Saussure, although older, must be rejected because it is preoccupied, and *Hymen-smithia* Dalla Torre, which has been proposed in lieu of it, also becomes a synonym of *Labus* Saussure.

Ashmead,¹ in his classification of the Vespoidea, includes *Labus* Saussure in his "Subfamily Discelinae" which he characterizes by the presence of two apical spurs on the middle tibiae. However, this character has not even generic value within the group of the Zethinae. In this same paper, Ashmead proposes a new genus *Micreumenes*¹ for *M. currici* Ashmead, a species which was never described; in his key the author places this new type near *Eumenes*, so that one would hardly guess that it is related to *Zethus*.

Through the courtesy of Mr. Crawford, I was able to study the type specimen of *Micreumenes currici* Ashmead in the U. S. National Museum. This specimen is a male and belongs to the Zethinae, because of its short mandibles which end at their truncate apex in three strong teeth. The original diagnosis of *Labus* Saussure (1867) applies exactly to this specimen. *Micreumenes currici* agrees, furthermore, in every detail with the description of *Labus macrostylus* Kohl (1907). Though Ashmead's name is older, it cannot claim priority, since it was not validated by a specific description.

Dalla Torre brought the American wasps which were described as *Labus* in a genus of their own, *Wettsteinia*, including *Labus brasiliensis* Fox and *L. sichelianus* Saussure²; Zavattari comprises both species in *Zethus* Fabricius, forming for them two divisions: (a) *Wettsteinia* Dalla Torre, with *L. brasiliensis* Fox and *Zethus strigosus* Saussure; (b) *Laboides* Zavattari, with *L. sichelianus* Saussure and *Zethus carinatus* Smith.³

¹ Canadian Entom., XXXIV, 1902, pp. 206 and 208.

² Genera Insectorum, Vesp., 1904, p. 13.

³ Arch. f. Naturg., LXXVIII, Abt. A, Heft 4, 1912, pp. 65 and 66.

The following diagnosis of the genus *Labus* is based on the African species, the only ones which I have seen so far. They are, however, very similar to *Labus spiniger* Saussure, which must be taken as the genotype.

Clypeus emarginate at its apex. Mandibles short; obliquely truncate at their apex; folded over each other and, when closed, for the most part hidden underneath the anterior margin of the clypeus; their apex tridentate in the male, quadridentate in the female; their outer surface with longitudinal grooves. Maxillary palpi 6-jointed. Labial palpi 4-jointed. Antennæ 12-jointed in the female, 13-jointed in the male; in the latter the terminal joint recurved as a hook at the under side of the eleventh joint. Tibiæ without spines on their outer side; the middle tibiæ with one or two apical spurs. Claws of the tarsi bifid at their apex. First abdominal segment very narrow, forming a long and slender petiole which is only slightly broadened towards its posterior extremity, and flattened or uniformly rounded on its dorsal face. Second abdominal segment subsessile or with a very short, narrowed basal neck. Wing venation remarkable by reason of the first cubital cell being much narrowed towards the radial cell or more or less petiolate, and the first recurrent nervure being almost the straight continuation of the inferior margin of the first cubital cell.

As characterized here, this genus differs from *Zethus* Fabricius, in its broader sense, in the second abdominal segment lacking a distinct basal neck; from *Elimus* Saussure and *Discaliscus* Latreille, in the shape of the abdominal petiole, which is not swollen laterally and above.

Labus, as defined here, includes 22 species, of which 17 occur in the Ethiopian region, the others being found in the Oriental region. Only three are known from the Belgian Congo.

Apparently, no observations have been made on the life history of any species of *Labus*.

Key to the Congo Species of *Labus*

1. Abdominal petiole (segment 1) sublinear in its basal half, then rather suddenly widened towards its apex which is more than twice as broad as its base (Fig. 29). Postscutellum with two distinct tubercles near the middle line. Middle femora, ♂, with a projecting basal tubercle beneath. Antennal hook, ♂ (Fig. 28). Length (h. + th. + t. 1 + 2), 7 to 8 mm. *L. maculicollis* Cameron. Abdominal petiole (segment 1) with almost subparallel sides, only slightly and very gradually widening towards its apex, which is not or scarcely twice as broad as its base. Postscutellum without distinct median tubercles, sometimes with an undulated ridge. Middle femora, ♂, without basal tubercle. .2.
2. Propodeum with a broad and long, rugosely reticulate, horizontal, median portion, abruptly truncate behind. Abdominal petiole distinctly shorter than the thorax (including the propodeum). Second sternite, ♂, without transverse arcuate ridges on the sides. Antennal hook, ♂ (Fig. 36), very narrow and slender. Length (h. + th. + t. 1 + 2), 6 to 6.5 mm.

L. garambensis, new species.

Propodeum convexly sloping behind the postscutellum, with a feeble median groove, finely punctate; abdominal petiole about as long as the thorax (including the propodeum). Second sternite, ♂, with transverse arcuate ripples in its apical third, on the sides. Antennal hook, ♂ (Fig. 18), thick and swollen in its apical half. Length (h. + th. + t. 1 + 2), 7 to 8 mm.

L. macrostylus Kohl.

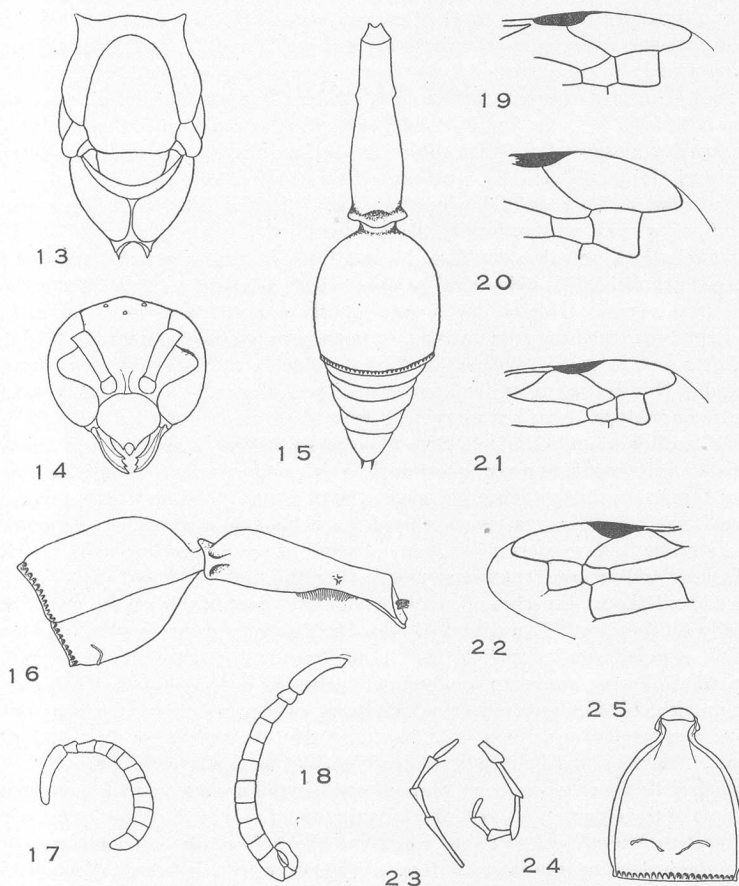
4. *Labus macrostylus* Kohl

The following description of the male is made on the specimen from Liberia, which was named by Ashmead *Micreumenes curriei*.

♂.— Head (Fig. 14) broad; inflated; as seen from above, distinctly wider than the anterior margin of the pronotum; subcircular, as seen in front. Clypeus transversely piriform; much broader than long; gradually narrowed towards its apex, which is deeply emarginate, with sharply projecting lateral teeth; surface of the clypeus regularly convex. Oculo-malar spaces obsolete. Mandibles short, folded horizontally under the apex of the clypeus so as to cover each other partly, scarcely forming an obtuse beak when half opened. Inner margin of the mandibles obliquely truncate, with three strong and sharp terminal teeth; their outer surface with distinct longitudinal grooves. Temples and occiput sharply margined throughout. Inner orbits distinctly convergent towards the clypeus. Vertex moderately convex; the ocelli placed in a broad-based triangle, the posterior ocelli about as far from each other as from the inner margin of the eyes. Temples moderately broad; as seen from above, not more inflated than the eyes. Antennæ inserted much below the middle of the head and rather close to each other; long and slender (Fig. 18); the first joint of the flagellum comparatively large; the second rather short, only slightly longer than the third; the following joints elongate. The eleventh joint of the antennæ is much longer than the preceding, distinctly longer than broad, slightly emarginate on its inner face towards its apex and with a longitudinal, broad, smooth, and shining groove; the twelfth joint small; the thirteenth or terminal joint long, as long as the eleventh, hook-shaped, slightly curved, somewhat swollen towards its apical half; this thirteenth joint ends in a blunt apex which is folded back in the groove on the under side of the flagellum, reaching near the base of the eleventh joint. Maxillary palpi (Fig. 24) 6-jointed; their basal joint thicker and shorter than their second or third; their three terminal joints about of equal length, together much longer than the third, each of them shorter than either the second or third. Labial palpi (Fig. 23) 4-jointed; their basal joints the longest; their three terminal joints subequal.

Thorax (Fig. 13) elongate; as seen from above and including the propodeum, distinctly more than one and one-half times as long as broad on its middle. Pronotum narrowed anteriorly; with distinctly raised front margin, which, however, is not carinate but ends on either side in a very strong, outwardly projecting, blunt tooth. Mesonotum normal, small, distinctly longer than broad, with very indistinct traces of parapsidal furrows. Scutellum flattened, feebly convex. Postscutellum strongly rugose, without distinct prominent tubercles or median furrow. Propodeum rather short, as seen from above; its sides rounded, without carinæ; much narrowed towards its posterior extremity; its middle line only slightly grooved

on its anterior horizontal portion, the furrow becoming much deeper on its vertical posterior part; above the insertion of the abdomen, the propodeum is deeply emarginate and ends on each side in a projecting lamella. As seen in profile, these terminal plates are sharply bidentate, the lower tooth being much longer and stouter than the



Figs. 13-25. *Labus macrostylus* Kohl.

Fig. 13. Thorax from above, ♂. Fig. 14. Head in front, ♂. Fig. 15. Abdomen from above, ♂. Fig. 16. First and second abdominal segments in profile, ♂. Fig. 17. Antenna, ♀. Fig. 18. Antenna, ♂. Fig. 19. Front wing with broadly open second cubital cell, ♂. Fig. 20. Front wing with petiolate second cubital cell, ♀. Fig. 21. Venation of right front wing, ♂. Fig. 22. Venation of left front wing, ♂. Fig. 23. Labial palpus, ♂. Fig. 24. Maxillary palpus, ♂. Fig. 25. Second abdominal sternite, ♂. The drawings in Figs. 13 to 16, 18, and 21 to 25 were made from the type specimen of *Micreumenes curriei* Ashmead.

upper one. Mesopleura without sutures dividing the episterna or separating the epimera; the mesopleura strongly swollen, with an anterior and a posterior depres-

sion forming epinemia for the front and middle legs; but these epinemia are not bordered by raised carinæ. Legs comparatively long and heavy, especially those of the hind pair; the tibiæ distinctly widened towards their apical third; the outer surface of the tibiæ densely hairy, but not spiny. Middle tibiæ with a single apical spur. Tarsi slender, elongate; claws bifid at their apex. Base of the middle femora without a tubercle, but with a patch of grayish hairs at the under side.

Wing venation very similar on both sides (Figs. 21 and 22). The second cubital cell trapezoidal; much narrowed; closed or nearly so on the radial cell, though not petiolate. The first recurrent nervure in a straight line with the inferior margin of the second cubital cell; the first intercubitus very oblique, almost in the continuation of the inferior margin of the first cubital cell; this cell very large, larger than the second and third cubital cells together. Third cubital cell widened towards its apical margin, as long as or longer than high. Radial cell broad, very bluntly rounded at its apex, without appendiculate vein.

Abdomen long and slender (Figs. 15 and 16). Its first segment narrowed into an almost parallel-sided, cylindrical petiole, which is about as long as the thorax as seen from above. This petiole is very slightly widened in its posterior half and much more broadened towards its apex, so as to form two projecting rounded lateral edges. As seen in profile, the petiole dilates suddenly at a short distance from its base and is thence slightly swollen towards its posterior extremity. Its dorsal face presents, in front of its apical margin, a deep transverse depression followed by a terminal swollen, rounded ridge. Second segment distinctly shorter than the first; constricted at its base into a very short neck, which is much narrower than the dilated apex of the first tergite; thence bell-shaped with a duplicated terminal margin; its preapical, swollen, transverse portion bordered behind by a row of deep punctures. Second sternite in its posterior third, on each side of the middle line, with a slightly raised, short and arcuate, transverse rimple (Fig. 25).

Head and thorax densely and coarsely punctate; more finely on the propodeum, especially on its sides. Punctuation of the abdomen very coarse on the first tergite (petiole), especially on its anterior part, much finer and remoter on the second segment; the following segments impunctate. The whole body covered with a very slight, grayish, bloomy pubescence, which becomes denser and more silvery on the clypeus, mesopleura, and tibiæ. On its under side the petiole, or first abdominal segment, presents about its middle a dense patch of long, silky-white hairs.

Black, with the following very reduced whitish-yellow markings: a large spot on the center of the clypeus; a short streak on the under side of the scape near its base; the projecting lateral angles of the pronotum; the posttegulae; a transverse spot in each of the projecting angles at the terminal margin of the first tergite; a preapical, somewhat interrupted, narrow, transverse band on tergite and sternite 2, on their swollen portion; and the outside of the front and middle tibiæ. Terminal joints of the antennæ beneath and apical spurs of the tibiæ, testaceous. Wings slightly infusate with a feeble purplish effulgence; a darker spot in the radial and towards the apex of the median cell.

Length (h. + th. + t. 1 + 2), 7.5 mm.

Other males I have seen differ only in some details of the color markings. These may be more or less extended; the preapical, yellowish band on the second segment may be more or less interrupted, in one of the specimens only a few traces of this band being left. The length (h. + th. + t. 1 + 2) varies between 7.5 and 8 mm.

♀ — Very much like the male, except for the following points: Antennæ (Fig.

17) short; moderately swollen towards the middle of the flagellum; the first joint of the flagellum comparatively long, the second very short, only slightly longer than the third, the terminal joint large. Mandibles quadridentate at their apex. Clypeus much as in the male, the emargination of its apex broader and not so deep, with sharply projecting lateral teeth. Thorax rather more elongate than in the male; the abdominal petiole or first segment also more slender, in profile distinctly less swollen behind than in the male, as long as the thorax; on its ventral face the patch of long pubescence is less distinct. Second sternite without raised ridges.

The coloration in some specimens is very much the same as in the male, but the clypeus is always entirely black; as a rule, the legs and antennæ are also black. One female from Boswenda (Kivu) is completely black except for the apical band of the first tergite. In other females, however, the apex of the antennæ is testaceous beneath, and all the tibiæ have whitish marks on their outside.

Length of the ♀ (h. + th. + t. 1 + 2), 7 to 8 mm.

The venation of the wings is very variable in both sexes, and it is hard to find two specimens which agree exactly in this respect. The second cubital cell may be distinctly open on the radial cell, or closed, or more or less petiolate. Specimens with petiolate second cubital cells should, of course, be referred to Saussure's genus *Smithia*, but since no other differences can be discovered between such specimens and others with open or closed second cubital cell, I do not believe that these details of the wing venation have even specific value. Figs. 19 and 20 show two extremes in the shape of this cell.

Belgian Congo.—I have seen specimens from Banana, 3 ♀ ♀, September 1915; Zambi, 2 ♀ ♀, 1 ♂, June 1915; and Faradje, 1 ♂, January 1914 (Lang and Chapin Coll.). Rutschuru, 1 ♀, 2 ♂ ♂, September 1914; Boswenda, 1900 m., October 1914; Walikale, January 1915; Lubutu, January 1915; Lukula, September 1913; and Thysville, June 1915 (J. Bequaert Coll.). Luebo, 1 ♂ (D. W. Snyder Coll.; U. S. Nat. Mus.).

Liberia: Mt. Coffee, 1 ♂ (R. P. Currie Coll.; U. S. Nat. Mus., No. 20617); type specimen of *Micreumenes curriei* Ashmead.

This species was originally described from Sierra Leone. The localities given in the present paper show that it has a very wide range, extending throughout the West African forest region as far east as Lake Kivu.

Labus annulipes Cameron (= *L. fragilis* Meade Waldo) is probably a synonym of *L. macrostylus*; if this be true, this species reaches East Africa and Rhodesia.

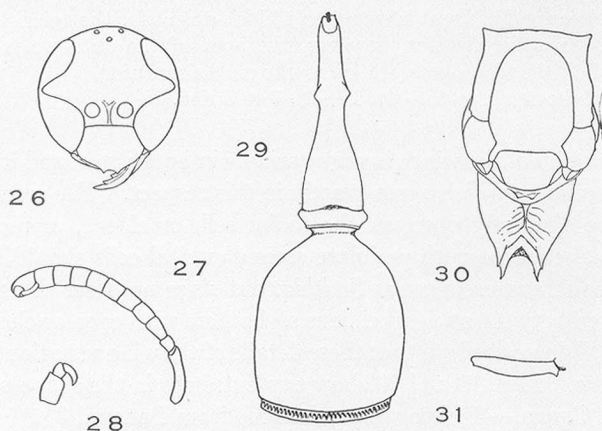
5. *Labus maculicollis* P. Cameron

This species comes very close to the preceding, so that it will be sufficient to point out the chief differences:

♂.—Head (Fig. 26) subcircular; the clypeus with a more shallow emargination at its apex. Mandibles tridentate at their apex. Antennæ (Fig. 27) similar to

those of *L. macrostylus*, ♂, except for their terminal three joints; the thirteenth joint slender, strongly pointed, recurved into a hook and folded against the grooved under side of the eleventh joint (Fig. 28).

Thorax (Fig. 30) comparatively longer than in *L. macrostylus*. Pronotum with a raised, not carinate, anterior margin, ending laterally in very sharp, projecting teeth. Postscutellum slightly raised in the middle and with a median depression, so as to form two small projecting tubercles. Propodeum almost without punctures, but with a few transverse fine ripples. Middle femora only feebly narrowed towards



Figs. 26-31. *Labus maculicollis* P. Cameron.

Fig. 26. Head in front, ♂. Fig. 27. Antenna, ♂. Fig. 28. Terminal joints of antenna, ♂. Fig. 29. First and second tergites from above, ♂. Fig. 30. Thorax from above, ♂. Fig. 31. Middle femur, ♂.

the base, with a small but distinct basal tubercle projecting beneath (Fig. 31), without a basal patch of hairs. Middle tibiae with two distinct apical spurs. Wing venation similar to that of *L. macrostylus*; in all the specimens I have seen the second cubital cell is distinctly petiolate.

Abdomen (Fig. 29) long and slender. Its first segment very narrow, petiole-shaped; however, very distinctly widened behind its middle, its apex being much more than twice as broad as its base. This petiole is also distinctly flattened above in its posterior half; in profile its shape is much like in *L. macrostylus* but it is less swollen above in front of its preapical transverse furrow. There is no patch of long gray hairs on its under side. The second sternite does not present arcuate transverse ripples on its posterior third.

Sculpture coarse and dense, more remote on the clypeus; very fine, almost obsolete on the propodeum; the punctation is much finer on the second abdominal segment than on the first.

The coloration is variable, as in *L. macrostylus*; one of the males is colored almost like the type specimen of that species; but others are nearly entirely black, lacking even the yellow spots on the clypeus and on the projecting angles of the pronotum.

Length (h. + th. + t. 1 + 2), 7 to 8 mm.

♀.—Very much like the male, except for the secondary sexual characters. Mandibles quadridentate at their apex. Middle femora without a basal tubercle. These females can best be separated from those of *L. macrostylus* by the shape of the first tergite and the distinctly projecting tubercles of the postscutellum.

Length (h. + th. + t. 1 + 2), 7 to 8 mm.

Belgian Congo.—Malela, 1 ♂, July 1915; Lukula, 1 ♀, Sept. 1, 1913; Lubutu, 1 ♂; and Rutshuru, 1 ♂ and 1 ♀ (J. Bequaert Coll.). Faradje, 1 ♂ and Stanleyville, 1 ♀ and 2 ♂♂ (Lang and Chapin Coll.). Previously known from Uganda and Mt. Kilimanjaro (1300 m.).

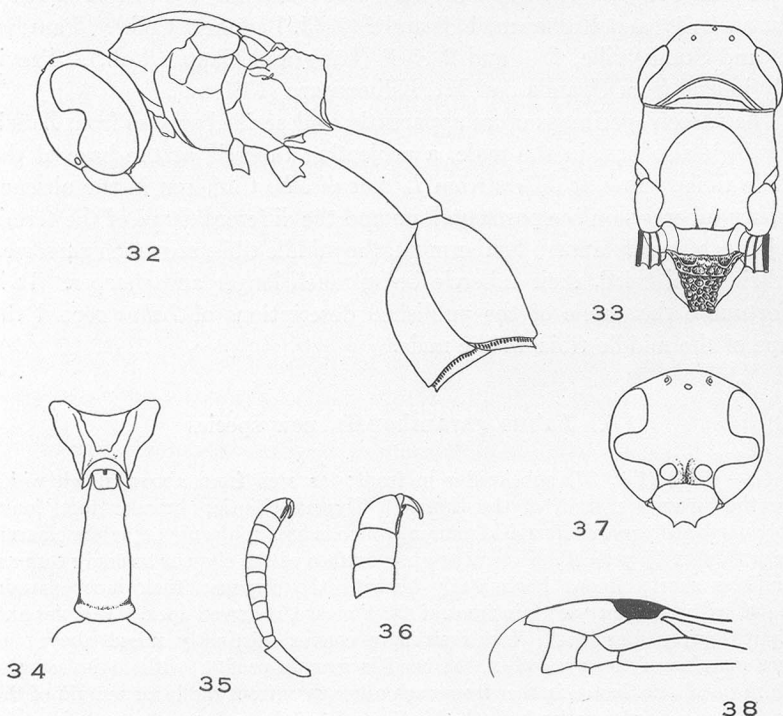
I have seen specimens of an apparently undescribed species from Zanzibar which also has, in the male, a projecting tubercle at the base of the middle tibiæ. But, it differs from *L. maculicollis* Cameron in the absence of spiny tubercles on the postscutellum and the different shape of the terminal joints of the antennæ; furthermore, the middle tibiæ are much narrowed in their basal third, their tubercle being much longer and sharper. It is unfortunate that none of the published descriptions of *Labus* record the shape of the middle tibiæ in the male.

6. *Labus garambensis*, new species

♀.—Head (Fig. 37) subcircular in front; as seen from above, much wider than the anterior margin of the thorax. Clypeus elliptic; broader than long; feebly narrowed towards its apical margin, which is broad; deeply arcuately emarginate with sharply projecting lateral teeth. Surface of the clypeus strongly convex. Mandibles short; folded horizontally beneath the clypeus; their inner margin oblique, with two sharp teeth in front of the elongate, recurved apex. Temples and occiput sharply margined. Vertex strongly convex, distinctly raised above the upper margins of the eyes when the head is seen in profile; without fovea; the posterior ocelli distinctly farther from each other than from the inner margin of the eyes, and about twice as far from the hind margin of the vertex. Antennæ inserted at the inferior third of the head, short; their flagellum distinctly inflated; their third joint scarcely longer than the fourth.

Thorax (Fig. 33) elongate; as seen from above and including the propodeum, about one and one-half times as long as broad at its middle. Pronotum only slightly narrowed towards its anterior margin which is almost straightly truncate and not carinate; only feebly raised on its sides and with outwardly projecting, sharp, lateral angles. Mesonotum nearly as broad as long, with feeble and short parapsidal furrows in front of the scutellum. Scutellum flattened, normal. Postscutellum comparatively long; transverse; without distinct median tubercles but with a transverse undulated crest, which forms on each side a raised lamella excavated in front; its surface entirely rugose-reticulate. Propodeum elongate, as seen from above; with a broad and long horizontal median part, which is abruptly truncate behind and almost vertically sloping on the sides. This horizontal face is almost as long as the scutellum and postscutellum together, and on the same level; it is

very strongly projecting behind. Only the inferior half of the vertical face of the propodeum is excavated into a small, but very regular and deep, concavity in which the anterior face of the petiole fits when the abdomen is bent upward. The lateral decolorate lamellæ, which terminate the margins of the concavity on each side of the insertion of the abdomen, are very small in this species and form blunt teeth. From these terminal teeth a feeble longitudinal carina ascends the sides of the propodeum towards its stigmata. Mesopleura strongly swollen, with sutures dividing the



Figs. 32-38. *Labus garambensis*, new species.

Fig. 32. Head, thorax, and two basal abdominal segments in profile, ♀. Fig. 33. Thorax and head from above, ♀. Fig. 34. First abdominal tergite from above and propodeum seen obliquely from behind, ♀. Fig. 35. Antenna, ♂. Fig. 36. Terminal joints of antenna, ♂. Fig. 37. Head in front, ♀. Fig. 38. Venation of front wing, ♀.

episterna and separating the epimera; a distinct anterior carina borders the epicnemium of the front legs. Legs comparatively short and stout; the hind tibiae distinctly swollen towards their apex, their outer surface not spiny, but densely clothed with long hairs. Middle tibiae with a single apical spur. Hind coxæ with a very strong tooth on their upper face. Claws bifid before the apex.

Wing venation practically the same on both sides (Fig. 38); of typical *Labus* type. The second cubital cell trapezoidal, much narrowed above, though distinctly open on the radial cell; the first recurrent nervure is the straight continuation of

the inferior margin of the second cubital cell. First cubital cell distinctly larger than the second and third together. Third cubital cell short, much higher than long. Radial cell elongate, distinctly narrowed in its apical part, with a short trace of an appendiculate vein.

Abdomen (Fig. 32) elongate and slender; first segment forming a long, narrow, and almost parallel-sided, cylindrical petiole, which is distinctly shorter than the thorax as seen from above (Fig. 34), about two and one-half times as long as broad at its apex. This petiole is only very feebly and very gradually widened from its base towards its apex, which forms very blunt lateral edges. In profile, the petiole is suddenly raised above its base, then gradually swollen towards its middle, and presents a feeble transverse depression before its apex. Second segment scarcely shorter than the first; strongly constricted at its base into a very short neck, which is distinctly narrower than the apical margin of the first tergite. The whole of the second segment is bell-shaped, its sternite being distinctly convex and swollen near its base. Apical margin of the second tergite and sternite broadly decolorate, lamelliform, preceded by a feebly swollen transverse ridge, the furrow between both with a row of deep, minute pits.

Head, thorax, and abdominal petiole densely and coarsely punctate, almost reticulate; the sculpture of clypeus and tegulæ hardly different. Horizontal median part of the propodeum covered with a very coarse reticulum of deep pits. Second tergite and sternite uniformly and densely covered with very distinct punctures, which, however, are not so coarse as on the rest of the body. The following abdominal segments impunctate. Body covered with an abundant and dense, silvery pubescence.

Black, with the following ivory-white markings: a transverse fascia on the anterior margin of the pronotum, broadly interrupted on the middle line; a dot in the anterior angle of the tegulæ; the narrow inflated apical margin of the first tergite or petiole; the preapical inflated ridge on the second tergite and sternite, this preapical fascia continuing into the decolorate apical lamella; a stripe at the outer side of the front and middle tibiæ. Antennal scape and flagellum beneath, apex of mandibles, and larger part of front and middle legs, ferruginous. Wings subhyaline, slightly infusate towards their anterior margin.

Length (h. + th. + t. 1 + 2), 6 mm.

♂.—Very similar to the female, including its sculpture and coloration. Clypeus more transverse; its apical margin almost semicircularly emarginate, with stronger lateral teeth; the sculpture of the surface much finer, its upper part being almost impunctate; the whole being covered with long and dense, silvery pubescence. Antennæ (Fig. 35), when compared with those of *L. macrostylus*, ♂, only feebly elongate; the flagellum distinctly swollen towards its apex; their third joint scarcely longer than their fourth; terminal hook or thirteenth joint small, slender, feebly curved, its apical half narrowed into a sharp apex which reaches the base of the eleventh joint (Fig. 36); this eleventh joint presents on its under side a narrow elongate furrow. Second sternite much as in the female, strongly convex, without preapical lateral ripples, not flattened on its middle. Middle femora without a tooth at their base beneath. Central part of the clypeus and under side of antennal scape ivory-white.

Length (h. + th. + t. 1 + 2), 6.5 mm.

Belgian Congo.—The holotype is a female from Garamba, July 1914; the allotype is a male from the same locality (Lang and Chapin Coll.).

The only described *Labus* to which this new species has apparently some relationship is *L. gracilis* Kohl from Arabia (Mount Sinai), a species which is very imperfectly known. However, the shape of the propodeum and the punctuation of the abdomen are very different and do not allow any confusion between them. The form of the antennal hook in the male separates *L. garambensis* readily from the two other Congo species of the genus.

EUMENINÆ

Eumenes Latreille

About 250 species belonging to this genus are distributed throughout the world. A large number have been described from Africa, but most of them are based merely on color markings. As is so often the case among the Vespidæ, the coloration possesses an almost inexhaustible variability, and therefore the number of true specific forms will sooner or later have to be considerably reduced. Very valuable efforts in this direction have been made in recent years by A. v. Schulthess, who was able to compare the types described by various earlier writers, and his conclusions as to the relationship of different color variations to each other are, for the most part, accepted here. The number of Ethiopian species which may be separated on morphological characters is comparatively small. Both size and color may be very variable in all of them. A similar color pattern may be found in different species; moreover, different color varieties of the same species may occur together in the same region, sometimes together with similarly colored forms of other species, so that these color variations can hardly be considered as geographical races. Another important result of A. von Schulthess' investigations is to show us for the first time the very wide distribution of several species which were previously known under different names from different countries.

The color variations of many species of *Eumenes*, even outside the Ethiopian region, are made up by the combination of three colors: black, rufous-red, and yellow or whitish-yellow.

a) Totally black forms are very rare, most of the apparently black specimens showing some rufous marks, either on the antennæ, clypeus, or legs. *Eumenes melanosomus* var. *aterrimus* A. v. Schulthess comes closest to the perfectly black type, but even in that form the mandibles are rufous.

b) Black-and-reddish forms are very common. As a rule, the rufous color does not form definite markings but rather suffuses certain parts of the insect. Sometimes the body may be nearly totally rufous-red with very few black markings.

c) Black-and-yellow forms. The yellow color may present any tint from orange to deep yellow, sulfur-yellow, or even white; but nearly always the pale color forms definite markings, giving to a whole group of specimens a very peculiar appearance. This black-and-yellow type is more common in the temperate parts of the Northern Hemisphere, e. g., *E. coarctatus* (Linné) and *E. fraternus* Say; it is very rare in the Ethiopian region. I do not know of any species in which this yellow color extends over practically the whole insect.

d) Forms with a combination of black, ferruginous, and yellowish make up by far the majority of the color variations. Various parts of the body are suffused with rufous, while the yellowish markings are well defined. In some extreme cases, the black color has nearly completely disappeared, and the combination becomes yellow with rufous-red.

Since the species known from the Belgian Congo are not numerous, little need be said of the various attempts to divide *Eumenes* into natural subgenera. *Paraeumenes* may be accepted as a distinct genus and located in the Zethinæ on account of its short mandibles, which end in a truncate and dentate apex. Later on, I shall give the reasons for believing that *Pachy-menes* is best considered as a genus; it forms the natural transition between *Eumenes* and *Odynerus* subgenus *Rygchium* and also shows relationship to some social wasps. It may be well to point out that the "subgenus *Eumenidion*," recently proposed by A. von Schulthess,¹ is strictly synonymous with *Eumenes* Latreille, the "typus subgeneris: *E. coarctatus* L." being the genotype of *Eumenes* as designated by Latreille himself.²

Ethology. Observations have been published on the habits of several species from Europe [*E. coarctatus* (Linné), *E. arbustorum* (Panzer), *E. unguiculatus* (Villers)], North America [*E. fraternus* Say, *E. bollii* Cresson, *E. belfragei* Cresson, *E. smithii* Saussure], South America [*E. canaliculatus* (Olivier) and several others], the Oriental region [*E. maxillosus* var., *E. germaini* Lucas, *E. dorycus* Maindron], and Africa [*E. maxillosus* (de Geer), *E. caffer* (Linné)]. All these agree in describing the females as "potter wasps": the females construct globular or oval nests of clay or of sand and mud mixed; these nests are attached to twigs of shrubs or trees, to walls, or to stones. The number of cells is variable, but never very large; the smaller species apparently build isolated cells. When a mud cell is completed the female deposits an egg which is attached with a thread to the bottom. She then fills the cell completely with caterpillars and walls it up with mud. Maindron is the only observer to record that certain Oriental species prey indifferently on caterpillars and spiders, but his observations need verification.

¹ Societas entomol., XXVIII, 1913, p. 2.

² Considér. génér. Crust. Arachn. et Ins., 1810, p. 438.

A more extensive account of the habits of some of the African species is given on pp. 65-68 and 72.

Key to the Congo Species of *Eumenes*

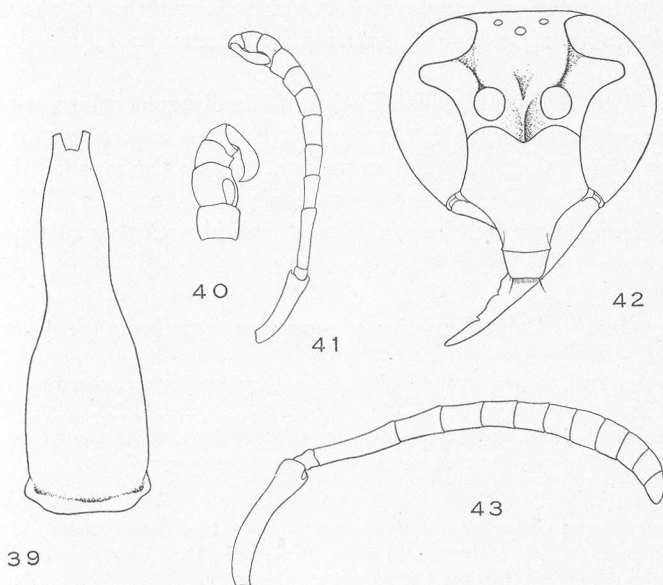
1. Posterior part of the mesopleura with a raised and sharp, vertical carina in front of their hind margin, bordering the epicnemium of the middle legs. Abdominal petiole very slender, with a longitudinal, shallow groove on its dorsal face. Hind margin of the second tergite slightly depressed.
E. melanosomus Saussure.
Mesopleura without raised posterior carina for the epicnemium of the middle legs. Abdominal petiole not canaliculate on its dorsal face. 2.
2. Apical part of the second tergite double: its posterior margin depressed, smooth and thin, preceded by a swollen ridge, both being separated by a deep and strongly punctate groove. Second tergite strongly punctate and with transverse rugosities on its posterior half. Small species; ♀ length (h. + th. + t. 1 + 2), 8 mm. *E. langi*, new species.
Apical part of the second tergite simple, without strongly depressed hind margin. Surface of the second tergite without transverse rugosities. Medium-sized or large species. 3.
3. Thorax distinctly longer than wide or high. Abdominal petiole rather thick, shorter than the thorax, its basal half with subparallel sides; or the petiole slightly narrowed towards its middle; thence suddenly widened behind the projecting lateral stigmata; its apex distinctly broadened and bluntly angulate on the sides. *E. maxillosus* (de Geer).
Thorax much shorter, the abdominal petiole slender, nearly as long as or longer than the thorax. 4.
4. Abdominal petiole gradually widening from its base to its apex. Antennæ moderately swollen, in the ♀ about as long as head plus thorax; joints 8, 9, and 10 hardly as broad as long. *E. lepeleterii* Saussure.
Abdominal petiole with subparallel sides in its basal as well as in its terminal half, suddenly widening behind its middle. Antennæ thicker, in the ♀ about as long as the thorax; joints 8, 9, and 10 as broad as or broader than long.
E. caffer (Linné).

Some practice is required to separate properly the females of *E. maxillosus*, *E. lepeleterii*, and *E. caffer*; but these species can always be easily identified in the male sex by the structure of the antennæ, of which drawings are given in this paper.

Eumenes maxillosus (de Geer)

♀.—Head (Fig. 42), as seen in front, scarcely one-fifth broader than high. Clypeus nearly as long as broad; its terminal margin straight or indistinctly curved outwardly, with sharp lateral edges in which terminate very short lateral oblique ridges. Front between the antennæ with a distinct, rounded protuberance, which is deeply grooved in its upper part. Antennæ (Fig. 43) short and inflated towards

their apical half, about as long as the thorax, their terminal joints nearly as broad as long. Thorax about one-third longer than wide and high. Mesopleura with a more or less distinct suture dividing the episterna into an upper and under sclerite, without a carina in their posterior part. Scutellum with a very superficial, median, longitudinal carina in its anterior half. Abdominal petiole (Fig. 39) broad and thick, distinctly shorter than the thorax; its basal half with subparallel sides or even slightly narrowed toward its middle, where it is suddenly much broadened and presents on each side a distinct spine-like projection bearing the stigmata; its broader posterior half is distinctly widened towards its apex, where it ends in two blunt lateral edges. Upper surface of the petiole smooth, with a few remote punctures, convex and without a longitudinal groove. The petiole is scarcely more than three



Figs. 39-43. *Eumenes mazillosus* (de Geer).

Fig. 39. First abdominal tergite from above, ♀. Fig. 40. Terminal joints of antenna, ♂. Fig. 41. Antenna, ♂. Fig. 42. Head in front, ♀. Fig. 43. Antenna, ♀.

times as long as the width of its apex. Second abdominal segment strongly inflated; much narrowed towards its base, which in its constricted part is only half as broad as the apex of the petiole; its hind margin simple, not depressed; its surface apparently smooth, without any strong punctation; second abdominal sternite flattened or depressed on its middle, the depression sometimes very deep, especially in large specimens.

Length (h. + th. + t. 1 + 2) varies considerably: from 28 to 30 mm. Occasionally one sees specimens which do not exceed 17 mm.

♂.— Differs from the female chiefly in the structure of the antennæ (Fig. 41) which are much longer; their flagellum somewhat moniliform, its different joints

being slightly swollen in their middle. The terminal hook-like joint of the antennæ (Fig. 40) is very long and thick, curved beyond its base, and distinctly swollen in its terminal half; it ends in a sharp and strongly bent apex, which reaches the base of the tenth joint and reposes, on the ventral face of this joint, in a broad and deep excavation. Clypeus much longer than broad. Apical, or seventh, abdominal sternite with a very deep, median, longitudinal groove.

Length (h. + th. + t. 1 + 2), 12 to 23 mm.

The coloration of this species is exceedingly variable. A list, with synonymy, of its African varieties may be found at the end of this paper. Outside Africa, the Oriental and Australian *E. circinalis* (Fabricius), *E. conicus* (Fabricius) = *E. saundersii* Nietner, *E. xanthurus* Saussure, and *E. petiolatus* (Fabricius) must certainly be referred to *E. maxillosus* (de Geer).

Figs. 44 to 49 show the distribution of the different color variations of this interesting species, which is one of the most typical wasps for the Ethiopian, Oriental, and Australian regions. It has also invaded the south-eastern part of the Mediterranean subregion, where other Ethiopian or Oriental elements are well known to occur mixed with the truly palearctic fauna.

Key to the Color Varieties of *Eumenes maxillosus* (de Geer)

1. Abdomen and thorax entirely black or with a few ferruginous tinges, always without yellow markings.....2.
- Abdomen black with yellow spots, or extensively ferruginous-red or orange-yellow. Thorax often extensively yellow or orange-yellow.....4.
2. Wings entirely deep black, with purple effulgence. Body black, with a few rufous tinges on head, antennæ, legs and apex of first tergite. No yellow markings, except on clypeus and head of the ♂...typical *maxillosus* (de Geer). Wings not uniformly deep black.....3.
3. Wings slightly suffused with brownish, becoming slightly and gradually darker towards their base. Black, with more or less extended ferruginous spots on head, prothorax, mesopleura, propodeum, legs, and apex of the first tergite; antennæ ferruginous-red. Head of the ♂ marked with yellow. Sometimes the whole of the first segment ferruginous-red.¹.....*circinalis* (Fabricius). (compare *xanthurus*).
- Wings dark brown in their basal half, subhyaline and somewhat milky in their apical half; the coloration as in *maxillosus*.....*reginus* (Saussure).
4. Abdomen abundantly marked with yellow; a small lateral spot near the apex of tergite 1 and broad transverse apical markings on tergites 2 to 5. Clypeus, a spot on the front and along the orbits, spots on pronotum, mesopleura,

¹ The var. *ferrugineus* Magretti, of which I have seen no specimens, is apparently very similar to *circinalis* (Fabricius).

the only form of which no specimens were available is *E. maxillosus dimidiatipennis* (Saussure), but there can be no doubt as to the relationship of this variety to the typical *E. maxillosus*. There are probably some more forms in the Oriental and Australian regions, described as species but which really belong to the group under discussion. Nevertheless, few other species of wasps give us, at the present time, so large a number of data for a study of variation and distribution.

The general area inhabited by the varieties of *E. maxillosus* is one which is occupied by many Old World wasps and other Hymenoptera too. But not until all students of Hymenoptera are willing to study the morphology of the species instead of describing paintings, may we hope to bring together reliable data on the many interesting problems connected with the distribution of insects in the Old World tropics. The geographic distribution of the genus *Ropalidia* and of the numerous forms which are very closely allied to *Odynerus hæmorrhoidalis* (Fabricius), if not merely color variations of a single morphological type, coincide in their broader lines with that of *E. maxillosus*. In the genus *Eumenes*, some other species, such as *E. caffer* (Linné) and *E. lepeleteri* Saussure, may also prove to extend over the Ethiopian, Oriental and Australian regions. However, there are undoubtedly true morphological species which are restricted either to the Ethiopian (*E. melanosomus* Saussure, *E. lucasius* Saussure), or to the Oriental or Australian (*E. bicinctus* Saussure) region. In other cases again, the range of the species includes only the Oriental and Australian regions, e. g., *E. arcuatus* (Fabricius). Even more striking facts will be disclosed when the distribution of the Palearctic and American *Eumenes* is studied in a similar manner.

It has been found that the life history of these different color varieties of *E. maxillosus* is the same (p. 67). The question arises now in how far these forms may be considered as geographical races. In comparing the maps, it will be seen that not one of these color forms extends over the whole range of the species, each of them being confined to an area of its own. Yet we can hardly consider them as true geographic forms, because most of them do not inhabit a given country to the exclusion of all others. The only exception to this rule is *E. maxillosus petiolatus* (Fabricius), which is the only form found on the Australian continent; however, in this case evidence in favor of a geographic race is not very strong, since this form extends over practically the whole of the Oriental and Australian regions. This applies also to *E. maxillosus dimidiatipennis* (Saussure), the only form known from Syria and Lower Egypt. In the other regions several color forms occur together: *E. maxillosus circinalis* (Fabricius), *E. maxillosus xanthurus* (Saussure), *E. maxillosus conicus* (Fabricius), and *E. maxillosus petiolatus*

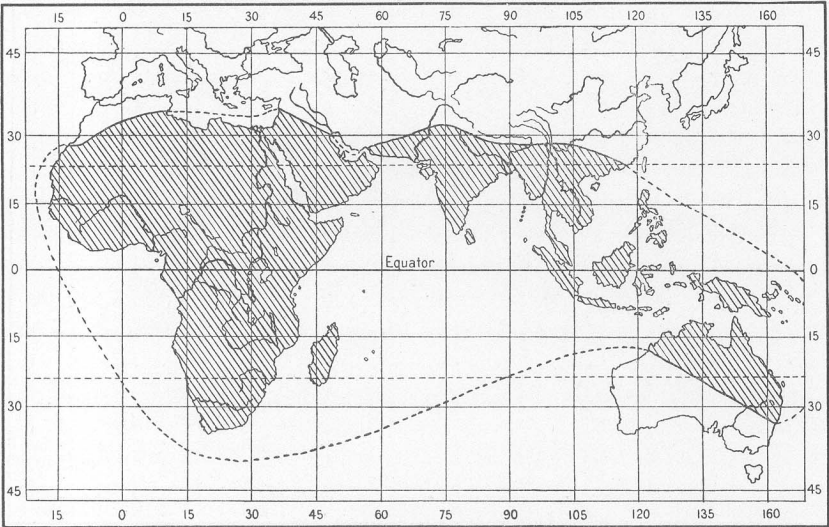


Fig. 44. Distribution of the morphological species *Eumenes marillosus* (de Geer).

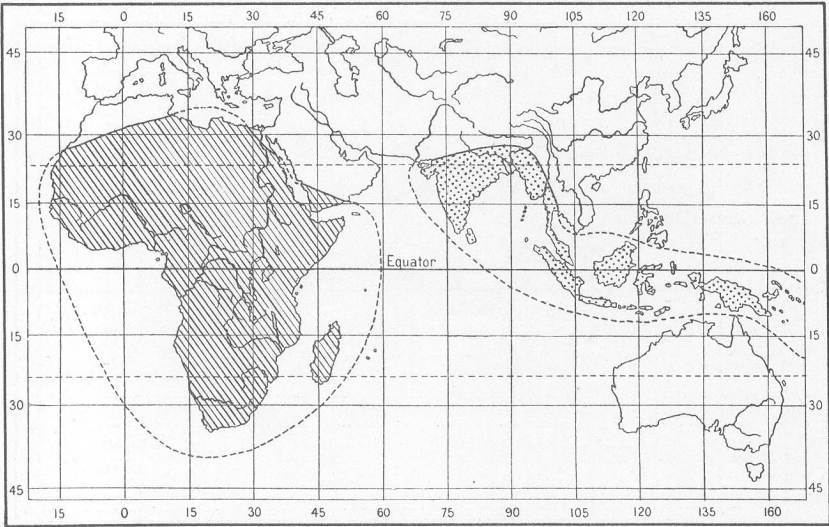


Fig. 45. Distribution of *Eumenes marillosus* (de Geer), typical form — lines — and *E. m.* var. *xanthurus* (Saussure) — dots.

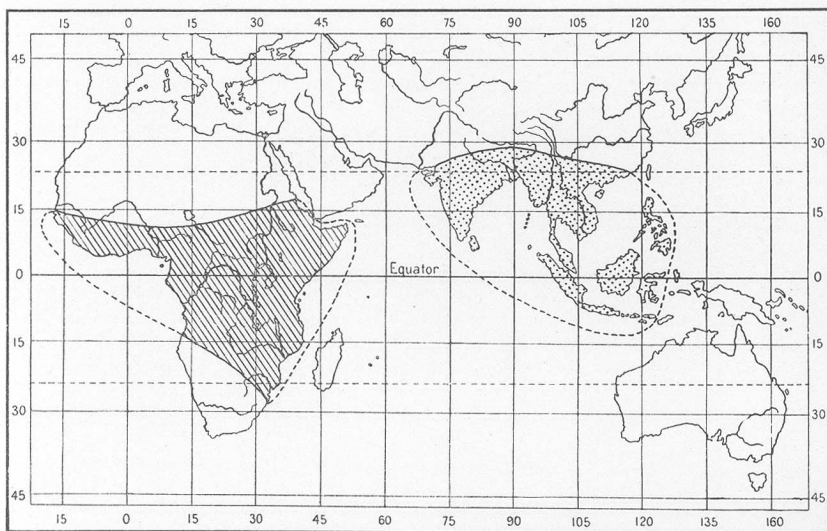


Fig. 46. Distribution of *Eumenes maxillosus* var. *fenestralis* (Saussure) — lines — and *E. m. var. conicus* (Fabricius) — dots.

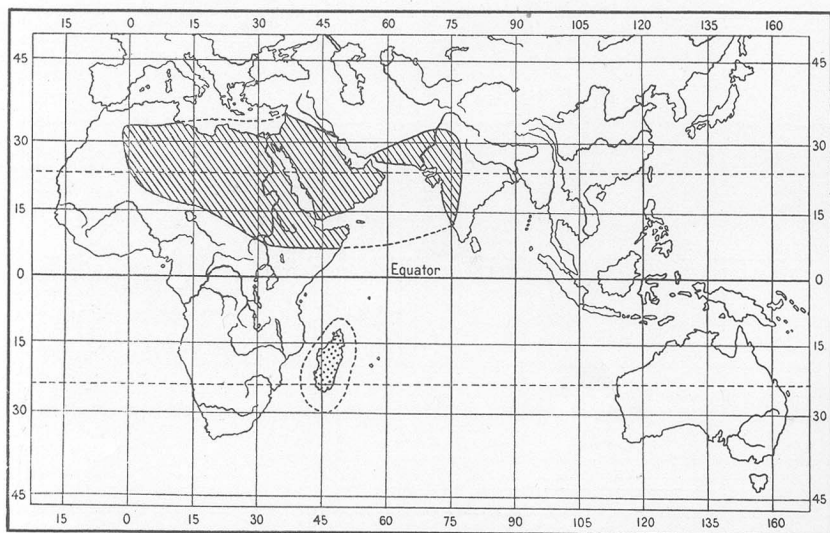


Fig. 47. Distribution of *Eumenes maxillosus* var. *dimidiatipennis* (Saussure) — lines — and *E. m. var. reginus* (Saussure) — dots.

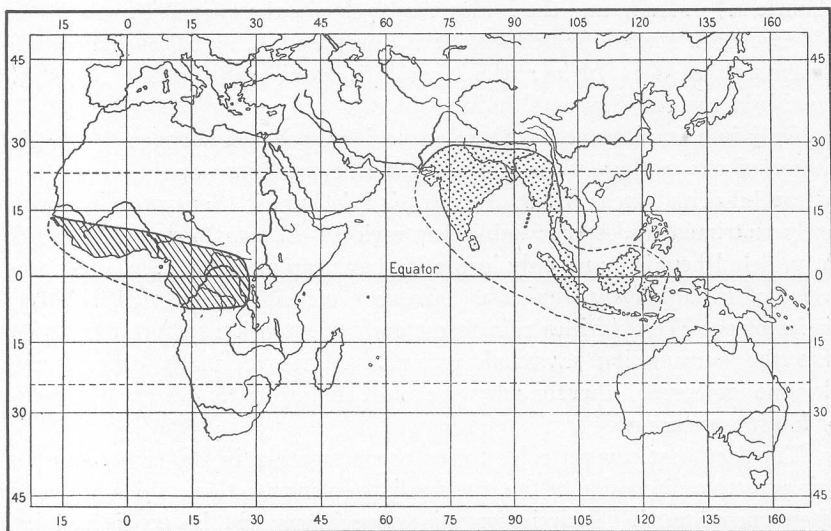


Fig. 48. Distribution of *Eumenes maxillosus* var. *tropicalis* (Saussure) — lines — and *E. m. var. circinalis* (Fabricius) — dots.

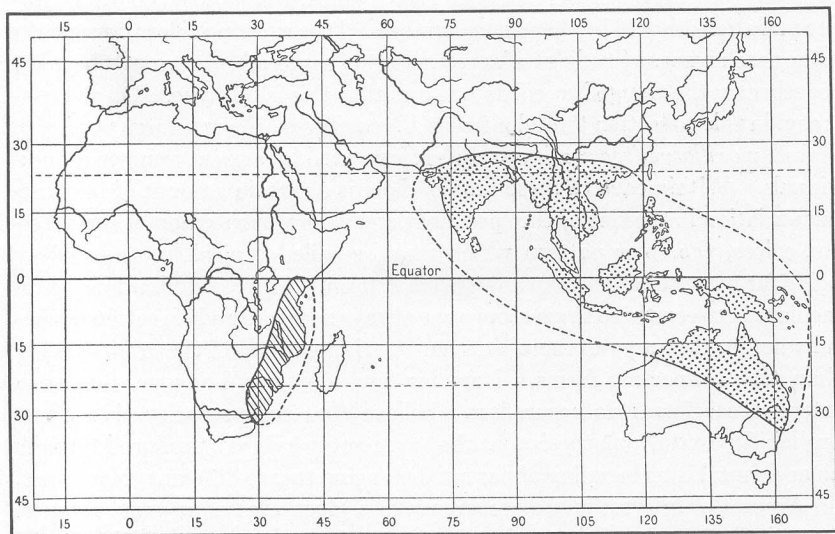


Fig. 49. Distribution of *Eumenes maxillosus* var. *pulcherrimus* A. v. Schulthess — lines — and *E. m. var. petiolatus* (Fabricius) — dots.

(Fabricius) in India and the Malay Archipelago; the typical *E. maxillosus* (de Geer), *E. maxillosus tropicalis* (Saussure), and *E. maxillosus fenestralis* (Saussure) in West Africa; the typical *E. maxillosus* (de Geer) and *E. maxillosus reginus* (Saussure) in Madagascar.

Only in a few instances is there any evident relation between the distribution of one of these forms and the climatic conditions or the vegetation of the inhabited area: *E. maxillosus dimidiatipennis* (Saussure) is apparently restricted to desert or sub-desert regions; *E. maxillosus pulcherrimus* A. v. Schulthess is found only in the East African savannahs; whereas the range of *E. maxillosus tropicalis* (Saussure), coincides fairly well with the limits of the West African rain forest and its extension as forest galleries into the surrounding savannah regions. Moreover, many other forms show no preference either for a dry or a moist climate, or for desert, savannah, or forest vegetation.

The fact that several color forms occur together in the same country brings us to a discussion of the intermediate color variations which are very often encountered. Such intermediate specimens will be considered by some students as linking the extremes, the idea apparently being that some of the different color patterns are merely individual variations of the ordinary fluctuating type. I believe, however, that this is not a true expression of the facts. If such fluctuating variation were the real cause of these different color forms of the morphological type *E. maxillosus*, the intermediate variations should be the most common and the extreme colorations ought to be much rarer. Study of a large amount of material, such as was brought together by the Congo Expedition, shows that this is not true. On the contrary, in this collection the color forms *E. maxillosus*, *E. maxillosus tropicalis*, and *E. maxillosus fenestralis* are each represented by a great number of individuals. Within each of these groups there is a certain amount of fluctuating variation in the size of the specimens and in the distribution of the different colors, the color pattern which may be called typical for the variety being far more common than any aberrant form. Color combinations intermediate between these three groups are always sporadic and it is often doubtful whether they are not merely extreme variants of one of the groups rather than true connecting forms. I am far from denying, however, that such intermediate forms do occur, but I believe that their scarcity gives some probability to the hypothesis that they are merely hybrids, produced through an accidental interbreeding of parents belonging to two different color types.

A point of interest is the occurrence in a given area of several varieties, very similarly colored, but belonging to species of *Eumenes* which may be easily separated on structural characters. The following are a few illustrations:

1. Typical *E. maxillosus* (de Geer), *E. lepeleterii hottentottus* (Saussure), *E. melanosomus aterrimus* A. v. Schulthess, and *E. caffer dyscherus* (Saussure), in West Africa.

2. Typical *E. lepeleterii* Saussure, typical *E. caffer* (Linné), and *E. maxillosus pulcherrimus* A. v. Schulthess, in Africa.

3. *E. maxillosus tropicalis* (Saussure) and *E. melanosomus æthiopicus* (Saussure), in West Africa.

4. *E. maxillosus fenestralis* (Saussure) and *E. lepeleterii tessmanni* A. v. Schulthess, in Africa.

5. *E. maxillosus petiolatus* (Fabricius) and *E. bicinctus* Saussure, in Australia. This case is of unusual interest because there are in Australia a number of Hymenoptera, belonging to different genera of solitary and social Vespidae and Apidae, all of which imitate the colors and pattern of *E. maxillosus petiolatus*.¹ I do not believe, however, that such a case can be included in the category of protective mimicry.

Ethology. The life history of *Eumenes maxillosus* has been completely worked out by E. Roubaud.² The mud nests of this species are sometimes very voluminous, the cells often numbering over 25, even 38; under unfavorable conditions, however, this number may be reduced to 4 or 5. These nests are commonly found on the walls of houses, inside or outside, more rarely on twigs, or tree trunks, or even on leaves or strong grass stalks. When attached to a wall, all the cells are disposed in a row side by side; when fixed to a stalk, the nest becomes an ovoid lump of earth. Very often the different chambers or cells are completely enclosed in a thick uniform mud covering. The mother wasp is never found inside the cell while in the course of building. In normal conditions, when the supply of food is abundant, this species follows the ordinary nesting rule of the solitary wasps: having fixed her egg in the bottom of the cell, the female accumulates hastily a provision of caterpillars and closes the cell before the egg hatches. *E. maxillosus* belongs, therefore, to that class of species characterized by "accelerated provision in mass"; indeed, the provisioning is so rapid that a single female may build and store four or five cells in forty-eight hours. However, during the dry season, or in desert regions, food becoming scarce and difficult to discover, the nesting is retarded and the prey is brought from day to day to the growing larva; the result being a marked decrease of the number of cells in each nest. The nesting instinct of this species may, under very unfavorable conditions, even present stranger aberrations: the female may deposit two or more eggs in a single cell amidst the provision of cater-

¹ R. C. L. Perkins, Proc. Zoolog. Soc. London, 1914, II, pp. 563-565.

² Ann. des Sc. naturelles, Zool., (10), 1, fasc. 1, 1916, pp. 43-60.

pillars, or she may even close up a cell with one or more eggs without any provision at all. The perturbation of the nursing habit may also lead to parasitic tendencies, the female wasp giving up the construction of a nest of her own to lay her eggs in the open cell of a neighboring female of the same species. Or else two females may constitute an abnormal and very rudimentary association to care for a single nest, one of them monopolizing the mason and nursing functions, whereas the other satisfies chiefly her reproductive instincts. "These associations, it is true, are still very imperfect and ill-defined; yet they are of unusual interest, as they permit us to catch in the very act the causes which directly determine a sudden and fundamental evolution of the solitary nesting habits of the Eumenidæ towards the behavior of the social wasps."¹

The prey of this wasp consists of caterpillars. During the rainy season these belong chiefly to the Geometridæ, more rarely to the Sphingidæ, and the mother wasp shows a marked preference for very large caterpillars. A single one may then be the complete provision of a cell. During the dry months, however, the female has to hunt for smaller caterpillars belonging to various groups: Pieridæ and Noctuidæ besides those indicated above. In this case, the number of caterpillars stored in a single cell may attain a dozen.

A common and well-known true parasite of *Eumenes maxillosus* is the large chrysid wasp, *Stilbum splendidum* (Fabricius).² Roubaud reared from the nest of this potter wasp a cryptine, *Mesostenus tripartitus* Brullé; according to his observations this parasite devours first the young *Eumenes* larva and later on feeds partly on the stored caterpillars; sometimes several *Mesostenus* larvæ live inside a single cell. Several Tachinidæ, parasites of stored caterpillars, were also obtained from cells of *E. maxillosus*; the commonest, *Pachyophthalmus pelopæi* (Rondani), is of special interest because its larva feeds externally on the caterpillars stored as provision in the cells but apparently does not attack the *Eumenes* larva. This fly has been bred also from nests of *Pelopæus*. Its larval habits show that it is a specific parasite of solitary Hymenoptera and adapted to feed on the paralyzed, but still fresh, prey in their nests. How the adult *Pachyophthalmus* escapes from the closed mud cell is still unknown.

A few details of the ethology of *E. maxillosus* had previously been contributed by F. Smith,³ Gueinzus,⁴ Magretti,⁵ H. Stadelmann,⁶ and, more

¹ E. Roubaud, *op. cit.*, p. 54.

² H. Brauns reared *Stilbum cyanurum* Forster var. *amethystinum* (Fabricius) from nests of *E. maxillosus* in South Africa (*Zeitschr. f. wiss. Insektenbiol.*, VII, 1911, p. 17).

³ Trans. Ent. Soc. London, (2), III, 1856, Proc., p. 128.

⁴ Trans. Ent. Soc. London, (2), V, 1858, p. 9.

⁵ Ann. Mus. civ. Genova, XXI, 1884, p. 610.

⁶ Deutsch Ost-Afrika, IV, 1898, Hym., p. 28.

recently, by L. Schuster.¹ The observations of the last named author are interesting because they show that in East Africa also, during the dry season (June), the mother wasp feeds her larva from day to day with entire caterpillars. Gueinzus (*loc. cit.*) has given an interesting account of the oviposition of the parasite, *Stilbum*, in the hard mud lumps of this potter wasp: "First it (the female *Stilbum*) uses its ovipositor as a gimlet, and when its point has a little penetrated, then as a saw or rasp; it likewise feels with its ovipositor, and finding an unfinished or an empty cell, it withdraws it immediately, without laying an egg."

The life history of the different color varieties is the same as that of the typical *E. maxillosus* (de Geer), so far as this has been ascertained. A. v. Schulthess² described the nest of *E. maxillosus reginus* (Saussure) from Madagascar. *E. maxillosus conicus* (Fabricius) = *E. saundersii* Nietner, has been repeatedly observed³ and we also possess records of the nesting habits of *E. maxillosus circinalis* (Fabricius),⁴ *E. maxillosus dimidiatipennis* (Saussure),⁵ and *E. maxillosus petiolatus* (Fabricius) = *E. latreillei* Saussure.⁶

7. *Eumenes maxillosus* (de Geer), typical form

The first described, or typical, form is the African *maxillosus* (de Geer) = *tinctor* Christ. In this, the female is black with ill-defined rufous-red markings spreading over the head, the thorax, the abdominal petiole, and the legs; the antennæ too are often for the most part ferruginous. In some very dark specimens the rufous may be restricted to parts of the head, antennæ, and legs. The wings are deep black with a strong violaceous effulgence. The coloration of the male is similar, but the rufous is found on the posterior abdominal sternites also, and the clypeus and front between the antennæ are intensively spotted with pale yellow. It is very difficult to find two specimens presenting exactly the same distribution of black and rufous; but I have never seen one which was entirely black. This color variation and the varieties *dimidiatipennis* (Saussure), *reginus* (Saussure), *circinalis* (Fabricius), *xanthurus* (Saussure), and *petiolatus* (Fabricius) (= *latreillei* Saussure), include the largest specimens.

The typical *E. maxillosus* (de Geer) is very common on the African continent from Egypt (Cairo, Assuan), Tripoli, the Central Sahara, and

¹ Zeitschr. f. wiss. Insektenbiol., VII, 1911, pp. 27-28.

² Reise Ost-Afrika, 1903-05, Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 71.

³ Saunders, Trans. Ent. Soc. London, I, 1834, pp. 60-62; Menzel, Mitt. naturf. Ges. Zürich, II, 1848, p. 97; Nietner, Stettin. ent. Zeitg., XVI, 1855, pp. 223-226; Bingham, Journ. Bombay Nat. Hist. Soc., XII, 1899, pp. 585-587; T. V. Aiyar Ramakrishna, idem, XX, 1910, pp. 341-343; C. Horne, Trans. Zool. Soc. London, VII, 1872, p. 166, Pl. xx, figs. 2 and 2a.

⁴ Maindron, Ann. Soc. ent. France, (6), II, 1882, p. 172.

⁵ E. Cretin, Journ. Bombay Nat. Hist. Soc., XIV, 1903, pp. 820-823.

⁶ Maindron, Ann. Soc. ent. France, (6), V, 1885, p. 219; H. L. Roth, Journ. Linn. Soc. London, Zool., XVIII, 1885, pp. 321-323, fig. 2.

Mauritania to the Cape; it is also found in Southern Arabia, on Sokotra, the Comoros, and Madagascar; on Mt. Ruwenzori as high as 2000 meters.

Belgian Congo.—Perhaps the most common wasp of that country. I have seen 75 ♀♀ and 60 ♂♂ from Banana, Malela, Zambi, Boma, Matadi, Thysville, Lisala, Nouvelle Anvers, Stanleyville, Lubutu, Avakubi, Batama, Gamangui, Poko, Medje, Niangara, Faradje, and Garamba. It shows no preference for forest or savannah and is apparently common at every season of the year.

Ethology. Mr. Lang made, at Faradje, January 1913, the following field notes with regard to the nesting habits of the typical *E. maxillosus* (de Geer). This large mud wasp had built on the sides of a wooden box a semi-oval mud nest which, when completed, was about 46 mm. long, 34 mm. wide, and 15 mm. high; the only cell found inside was broadly oval, 13 mm. wide and 27 mm. long. The work of building the nest was observed from the beginning to the end and lasted six days. No clay was fixed against the walls of the box so that the cell was open behind; the walls were built in the shape of a ring from the periphery to the center, till only a small central opening was left giving access to the cell; then the female stored three green caterpillars inside and closed the opening. After this was done, the whole nest was plastered with another layer of mud till it reached the size indicated above; the external surface was fairly rough. Having completed the nest the female flew off and never came back. When opened after two weeks, the cell was found to contain only the dry skins of the three caterpillars together with numerous pupæ of small parasitic Hymenoptera. The female was often observed to fly for a distance of 50 yards to the water, and when she returned she was able to moisten and mason in succession two lumps of dry dirt of 3 mm. in diameter, which she gathered from the mud between the bricks of the houses. The wasp was, as a rule, only at work from eleven o'clock in the morning until two in the afternoon.

8. *Eumenes maxillosus* var. *fenestralis* (Saussure)

♀.—Head, antennæ, thorax, legs, and abdominal petiole extensively ferruginous. The black being restricted to the apex of the antennæ, the vertex, the mesonotum, spots on the pleura, and a median dorsal spot near the end of the petiole. Base of the second abdominal segment and the terminal segments with ill-defined red-brown spots. The following markings are pale ivory-yellow: two large rectangular spots on the sides of the dorsal apical half of the petiole, some indistinct spots in the emargination of the eyes and on the front between the antennæ, and a narrow line interrupted in the middle on the anterior margin of the pronotum. Wings subhyaline with a slight yellow tint and a dark violet spot in the radial cell. The male is very similar, but the clypeus and the front between the antennæ are completely ivory-yellow. Wasps with this coloration are as a rule medium-sized.

This color variety is known from Senegal, Congo, Angola, Zanzibar, and Mt. Ruwenzori (7000 ft.). It is apparently as common in the Belgian Congo as the typical *maxillosus*. I have seen 16 ♀ ♀ and 26 ♂ ♂ from Banana, Malela, Zambi, Boma, Matadi, Lisala, Garamba, Faradje, Vankerckhoven-ville, and the Semliki River (between Beni and Kasindi).

9. *Eumenes maxillosus* var. *tropicalis* (Saussure)

Plate I, Figure 3

♀ and ♂.—Black, with a few ferruginous tints on head, thorax, and abdomen. The head and thorax intensively marked with bright yellow. This yellow color extends over the clypeus; the front between the antennæ; the hind margin and emargination of the eyes; practically the whole of the pronotum; a very large spot on the mesopleura and on the scutellum; a triangular, somewhat arcuate spot on each side on the anterior half of the mesonotum; nearly the whole of the postscutellum; two very extensive spots on the propodeum; and, on the anterior legs, the outside of the tibiæ and of the apical half of the femora. The wings, as in the var. *fenestralis* Saussure. The yellow stripe on the scutellum is often suffused with rufous. In all my specimens the abdomen has no yellow marks. Medium-sized form.

The var. *tropicalis* (Saussure) was known from Senegal, Cameroon, and Spanish Guinea. It is widely distributed in the Belgian Congo: Thysville, Stanleyville, Garamba, Medje, Niangara, Faradje, Yakuluku, Walikale, Bafwabaka, and Gamangui. I have seen 21 ♀ ♀ and 11 ♂ ♂.

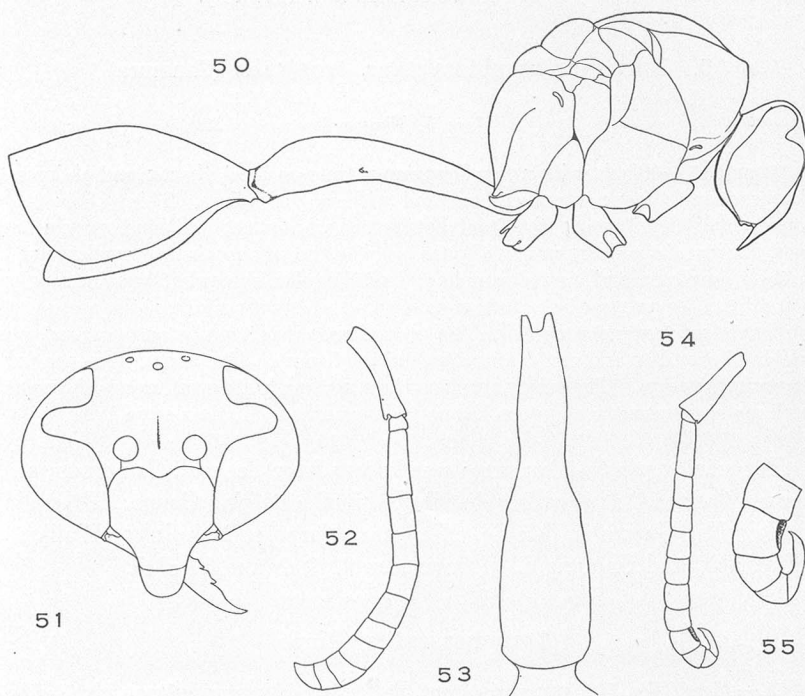
Eumenes caffer (Linné)

♀.—Head (Fig. 51), as seen in front, nearly one-fifth broader than high. Clypeus about as long as broad; its terminal margin straight or slightly curved outwardly; its edges rounded. Front slightly raised between the antennæ and with an upper longitudinal, superficial groove. Thorax (Fig. 50) short, but distinctly longer than broad or high. Mesopleura with a suture dividing the episterna into two parts, without carina in front of the epinemia of the middle legs; the suture limiting the epimera also distinct. Scutellum with a superficial, but distinct, longitudinal median carina in its anterior half. Abdominal petiole (Figs. 50 and 53) about as long as the thorax, slender, subparallel in its basal as well as in its terminal half, suddenly widening behind its middle, with distinct but feebly projecting lateral stigmata; the petiole is more than four times as long as broad at its apex; its upper surface is not grooved, strongly convex, with a few remote, very minute punctures. Second abdominal segment much as in *E. lepeleteri*, its sternite normally convex. Antennæ (Fig. 52) moderately long, about as long as the thorax; their flagellum distinctly swollen towards its apex; joints 8, 9, and 10 as broad or broader than long.

Length (h. + th. + t. 1 + 2), 12 to 18 mm.

♂.—Abdominal petiole slightly longer than the thorax. Clypeus distinctly longer than broad. Flagellum of the antennæ (Fig. 54) scarcely swollen towards its

apex, feebly moniliform. Its hook-like terminal joint (Fig. 55) has a shape nearly intermediate between that of *E. lepeleterii* and *E. maxillosus*; it is long and slender, with a broad base, slightly narrowed and feebly curved on its middle, again broader in its terminal part; its apex, however, is not spatulate, but ends in a sharp point



Figs. 50-55. *Eumenes caffer* Saussure.

Fig. 50. Head, thorax, and two basal abdominal segments in profile, ♀. Fig. 51. Head in front, ♀. Fig. 52. Antenna, ♀. Fig. 53. First abdominal tergite from above, ♀. Fig. 54. Antenna, ♂. Fig. 55. Terminal joints of antenna, ♂.

which is concealed in a small excavation on the under side, near the extremity of the tenth antennal joint. Terminal sternite of the abdomen with a feeble, groove-like depression towards its apex.

Length (h. + th. + t. 1 + 2), 12 to 18 mm.

This species has a wide range, being known on the African continent from the Central Sahara and Mauritania to the Cape; the var. *esuriens* (Fabricius) is common in India, and I have seen specimens from Formosa and Queensland (Fig. 56).

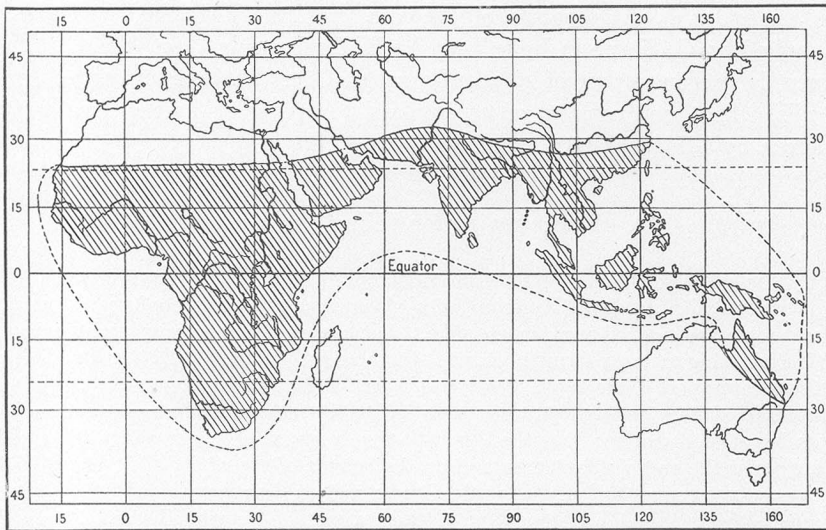


Fig. 56. Distribution of *Eumenes caffer* and its color varieties.

Key to the Color Varieties of *E. caffer* (Linné)

1. Body almost black, with a few ferruginous markings on head, thorax, legs, and petiole; head partly yellow. No yellow on thorax and abdomen.
dyscherus (Saussure).
 Thorax or thorax and abdomen more or less marked with yellow.....2.
2. Body, for the larger part, bright yellow; the mesonotum, as a rule, black; the abdomen, behind the petiole, with a broad black cross, the lateral branches of which run over the middle of the second tergite; a few ferruginous spots on head, thorax, and petiole (very similar to the typical *E. lepeleterii*).
 typical *caffer* (Linné) (= *formosa* Saussure).
 Abdomen behind the petiole not yellow with a black cross.....3.
3. Black, with abundant ferruginous markings on head, thorax, petiole, and base of second segment. The yellow restricted to the clypeus, spots on the head, a median stripe on the pronotum, spots on the legs, and sinuate preapical bands on tergites 3 to 5. Rarely the yellow more extended; in the ♂ the second tergite also, and even the petiole, with preapical spots.
gracilis Saussure.
 Black with abundant ferruginous markings as in the preceding; very often a broad basal band of that color on the second tergite; the yellow markings much more abundant and more extended on thorax and abdomen; the abdomen is, for the most part, yellow behind the apical third of the second tergite.
esuriens (Fabricius).

Ethology. The habits of the var. *esuriens* (Fabricius) have been studied by C. Horne in India¹ and by E. Roubaud in West Africa.² The nest is similar to that of *E. maxillosus* (de Geer) but smaller, with 4 or 5 cells. The prey consists of caterpillars. A parasitic beetle (*Emenadia*) and a fly (*Anthrax*) were bred from its nest.

10. *Eumenes caffer* (Linné), typical form

The coloration of the typical form, as described by Linné, is very similar to that of the typical *E. lepeletieri* Saussure, with which it may be easily confused. Female and male are marked very much alike. The insect is extensively bright yellow. The following parts are ferruginous red: the antennæ for a large part; the mandibles; the anterior part of the tegulæ; the greater part of the petiole, with two large yellow terminal spots; the basal part of the second tergite; the second sternite except for its broad hind margin; and the legs with the exception of small yellow spots and stripes at the end of the femora and on the outside of the tibiæ. The black color covers the terminal half of the flagellum and a spot on the upper side of the antennal scape; the vertex; the mesonotum; a transverse stripe between the scutellum and postscutellum, and a vertical streak on the middle of the propodeum; a spot in the anterior part of the mesosternum; the extreme base of the petiole and a T-shaped spot near its dorsal apex; and a broad cross over the second tergite which continues on the middle of the following tergite, turning, however, somewhat brownish towards the apex of the abdomen. In the male, the under side of the antennal scape may be extensively yellow. Wings subhyaline, with a slight yellowish tinge and a feeble purplish spot in the radial cell.

Belgian Congo.—13 ♀ ♀ and 14 ♂ ♂, all from the mouth of the Congo River: Banana, September 1915, and Boma, June 1915.

I can discover no differences between the description of *E. formosa* Saussure and my specimens of the typical *E. caffer* (Linné).

11. *Eumenes caffer* var. *gracilis* (Saussure)

The numerous specimens which I bring together under this name, have a similar general appearance, but they vary much in the details of the coloration. This variation, however, was well known to H. de Saussure himself.

The following is the more common form found in the Congo:

♀.—Mostly black and ferruginous. The latter color extends over the scape and the basal half of the flagellum; the mandibles; the greater part of the thorax, with the exception of all or part of the mesonotum and stripes along the different sutures, which are black; the legs; the abdominal petiole, with the exception of the

¹ Trans. Zool. Soc. London, VII, 3, 1870, p. 166.

² Ann. Sc. nat. Zool., (10), I, 1, 1916, p. 60.

black base and a large preapical black dorsal spot extending in the middle towards its apex; and the base of the second abdominal segment. The following parts are yellow: the clypeus; the front between the antennæ; the emargination and hind margin of the eyes; a median stripe on the pronotum, indistinctly interrupted; somewhat sinuate preapical bands on tergites 3, 4, and 5; and a few spots on the under side of the tibiae. Wings as in the preceding variety.

The male sometimes offers the same coloration, but as a rule the yellow markings are more extended in this sex, especially on the abdominal segments; even the second segment may present preapical lateral yellow spots and a small yellow dot on each side near the apex of the petiole; the yellow may extend over part or whole of the pronotum, or even appear on the mesopleura.

The var. *gracilis* (Saussure) was known from India, Southern Egypt, and Senegal.

Belgian Congo.—I have seen 19 ♀♀ and 19 ♂♂ from Zambi, Boma, Matadi, Thysville, Leopoldville, Lisala, Stanleyville, Vankerckhovenville, and Bogoro.

12. *Eumenes caffer* var. *esuriens* (Fabricius)

A female from Stanleyville presents the following coloration. Black. Mandibles, antennal scape beneath, flagellum in its basal half and on the under side, posterior half of the tegulæ, two large spots on the scutellum (only separated by a narrow median line), large spots on the sides of the propodeum, petiole on its ventral side and in the middle of its dorsal side, large spots on the second sternite extending on to the sides of the tergite, anal segment, and legs, almost entirely ferruginous-red. The following markings are bright yellow: the clypeus; the front between the antennæ; the emargination of the eyes; the external orbits on the temples; the pronotum except for its posterior angles; a large spot in the upper part of the mesopleura; the postscutellum; elongate spots on the sides of the propodeum; two apical spots on the first tergite; broad terminal bands on tergites and sternites 2 to 5, the band on the second tergite interrupted in the middle; and spots on the outside of the femora. Wings subhyaline, with a golden-yellowish tinge and a black-purplish spot in the apical part of the radial cell.

A male from Bogoro is very similar; the ferruginous-red color is more extended on the abdomen, where it forms on the second tergite a broad basal band interrupted by a black median line.

These specimens differ from *esuriens* (Fabricius), as figured by H. de Saussure,¹ in having the yellow apical band on tergite 2 interrupted in the middle and the ferruginous-red color not extending over the whole of the base of the second tergite. But a numerous series of specimens from India,

¹ Et. fam. Vesp., I, Eum., 1852, Pl. xi, fig. 2.

Formosa, and Queensland in the collection of the American Museum show very great variation as regards distribution of yellow, black, and ferruginous pattern in this form.

The var. *esuriens* (Fabricius) is the common form in the Oriental and Australian regions; but it was known also from Senegal.

Belgian Congo.—Stanleyville, 1 ♀, April 1915; Bogoro, 1 ♂, July 10, 1914.

13. *Eumenes caffer* var. *dyscherus* (H. de Saussure)

Very similar to a small *E. maxillosus* or *E. lepeleteri* var. *hottentottus*, but the shape of the abdominal petiole and of the antennal hook in the male place it undoubtedly with *E. caffer*. Black. Mandibles in their apical half, base of antennæ beneath, tegulæ partly, a few spots on the sides of the propodeum, the middle, under part and extreme apex of the petiole, and a few spots on the coxæ and near the apex of the tibiæ, ferruginous-red. Clypeus entirely, a broad frontal spot, the inner orbits beneath the emargination of the eyes, and a small spot near the apex of the tibiæ, yellow. Wings tinged as in typical *caffer* (Linné).

Belgian Congo.—One male from Stanleyville, April 1915, represents a melanistic color variation of *E. caffer* and I refer it to *E. dyscherus*, a form which has escaped further notice since Saussure's original description. This specimen lacks the apical yellow margin of the petiole and the dark purplish wings described by H. de Saussure for his *E. dyscherus*.

Eumenes lepeleteri Saussure

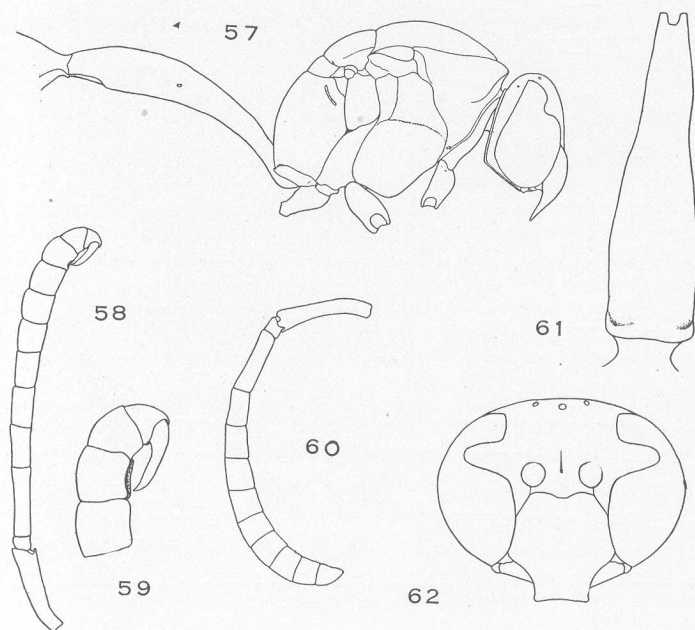
♀.—Head (Fig. 62) much broader than high. Clypeus nearly as long as broad; its terminal margin straight or feebly curved inwardly, with projecting blunt lateral edges. Thorax (Fig. 57) distinctly longer than wide or high, but much shorter than in *E. maxillosus*. Mesopleura without sharp carina in front of the epinemia of the middle legs, but with a distinct suture dividing the episterna and another, deeper one, separating the epimera. Abdominal petiole (Figs. 57 and 61) about four times as long as broad at its apex; as long as, or scarcely longer than, the thorax including the propodeum; slender, gradually widening from its base to its apex; its lateral projecting stigmata feeble; its upper surface not grooved. Second abdominal segment strongly inflated, much narrowed and subpetiolate at its base; its constricted part, however, distinctly more than half as wide as the apex of the first tergite; second abdominal sternite not or scarcely depressed on its middle. Antennæ (Fig. 60) long, moderately inflated towards the terminal half of the flagellum; about as long as head and thorax together; joints 8, 9, and 10 hardly as broad as long.

Length (h. + th. + t. 1 + 2), 17 to 19 mm.

♂.—The abdominal petiole is more slender than in the female; about as long as head and thorax together. The clypeus is narrower; somewhat longer than broad. The flagellum of the antennæ (Fig. 58) is swollen towards its apex and feebly moniliform; its hook-like terminal joint (Fig. 59) is long and very slender, tapering gradu-

ally from a triangular base to a very sharp apex, which is slightly curved and reposes in a very small excavation on the middle of the under side of the tenth antennal joint. Last abdominal sternite with a deep, median, groove-like depression towards its apex.

Length (h. + th. + t. 1 + 2), 12 to 16 mm.



Figs. 57-62. *Eumenes lepeleerii* var. *hollenloltus* (Saussure).

Fig. 57. Head, thorax, and two basal abdominal segments in profile, ♀. Fig. 58. Antenna, ♂. Fig. 59. Terminal joints of antenna, ♂. Fig. 60. Antenna, ♀. Fig. 61. First abdominal tergite from above, ♀. Fig. 62. Head in front, ♀.

Widely distributed on the African continent, from Senegal and the White Nile to the Cape; found also on Madagascar and the Seychelles, in Southern Arabia and on Sokotra, in Egypt, Syria, and on Cyprus (Fig. 63). *E. lepeleerii* is, however, not uniformly distributed over the African continent; it is chiefly an East African species. It is always very rare in the West African forest region, preferring the open savannahs. It would be interesting to map out the distribution of the different color varieties in a manner similar to that done for *E. maxillosus*, but the available information is insufficient. It may be noticed that, out of the nine varieties, four have been recorded from the West African subregion, only two of which were found in the forest region; four exist in East Africa; and three are restricted to the Malagassy subregion.

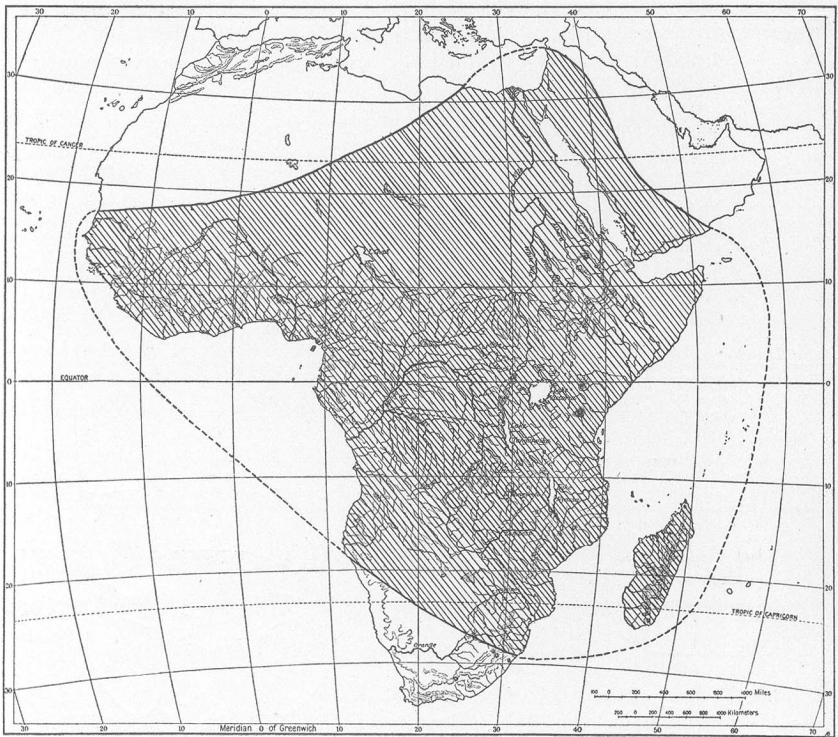


Fig. 63. Distribution of *Eumenes lepeleterii* and its color varieties.

Synoptical Table of the Color Varieties of *E. lepeleterii* Saussure

(Varieties *alluaudi*, *guerini*, *concinus*, *asinus*, *tessmanni*, and *pensilis* are included after the descriptions of J. Pérez, H. de Saussure, and A. von Schulthess, since I have seen no specimens of these forms).

1. Head, thorax and abdominal petiole bright orange-yellow; the vertex, mesonotum, and abdomen behind the petiole, black. Wings dark brown with purplish effulgence.....*alluaudi* (J. Pérez).
Body not with black and bright orange marks as indicated above. Wings dark purplish-brown or subhyaline, often with golden-yellowish tinge.....2.
2. Abdomen without yellow or yellowish-white markings, black or ferruginous-red and black.....3.
Abdomen more or less abundantly marked with yellow or whitish-yellow, at least on the petiole. Wings subhyaline, more or less tinged with golden-yellow.....5.

3. Wings dark brown with purplish effulgence. Body almost entirely black, with a few ferruginous spots on head, thorax, legs and petiole. A few yellow spots on the head. (Very similar to typical *E. maxillosus*)...*hottentottus* (Saussure).
Wings subhyaline with feeble yellowish tinge.....4.
4. Body almost entirely black, with a few ferruginous spots on head, thorax, legs, petiole, and also on the apical margins of the terminal tergites. Head and thorax with a few yellowish-white spots.
guerini (Saussure) (= *E. sakalava* Saussure).
Body for the most part ferruginous-red, more or less darkened, with more or less abundant black markings, very often with a distinct black cross on the second tergite. Only the clypeus and markings on the head in the ♂ yellowish.
concinus (Saussure).
5. Yellowish markings very abundant on head, thorax, and abdomen; the tergites behind the petiole for the most part bright yellow with a well marked black cross, the branches of which run over the middle of the second tergite.....6.
Yellowish markings much more reduced, the abdomen only with a few markings on the petiole or on the two first tergites.....7.
6. Mostly black and yellow, the ferruginous being much reduced; the cross on the abdomen black.....typical *lepeleteri* Saussure (= *E. granti* Kirby).
Black ground color almost entirely replaced by ferruginous-red, the cross on the abdomen also of the same red color.....*asinus* (Saussure).
7. Black, with abundant ferruginous markings on head, thorax, and abdomen; the head, thorax, and the apex of first and second tergites, with a few reduced yellow spots.....*stuhlmanni* A. v. Schulthess.
Black, almost without ferruginous markings. Clypeus (in the ♂), frontal spot, external and internal orbites, pronotum, postscutellum, lateral spots on the propodeum, two small apical spots on the petiole, and legs externally, yellow.
tessmanni A. v. Schulthess.
Black, with rufous tinge. Postscutellum, petiole, and second tergite with a narrow ivory-white apical band.....*pensilis* (Saussure).

Nothing seems to be known as to the life habits of this species.

14. ***Eumenes lepeleteri*** Saussure, typical form

The first described form, or typical *E. lepeleteri* Saussure, has a very striking coloration, being for the greater part bright yellow. The black is restricted to the upper side of the antennal scape and the extremity of the flagellum; the mesonotum; a transverse stripe between the scutellum and postscutellum; a longitudinal median stripe on the propodeum; the greater part of meso- and metapleura; and a broad cross on the second tergite, this cross extending over the apical half of the petiole and over the middle of the posterior segments. The ventral side of the abdomen is mostly black, without yellow markings. The following parts are ferruginous-red; the antennæ for the greater part; the mandibles; the tegulæ; the base of the petiole on its dorsal face and its apex on its ventral side; the two apical abdominal segments; and the legs, except for the front tibiæ and femora which are mostly yellow. The

wings are suffused with golden-yellow, the radial cell having an effulgent purple spot. The color is nearly the same in both sexes.

This is the coloration found in 5 specimens (2 males and 3 females) from the Lower Congo region: Boma, Matadi (Belgian Congo), and Noki (Angola).

There is, in my opinion, hardly any difference between the typical *lepeleteri* Saussure and the form described and figured by Kirby under the name *Eumenes granti*. The amount of red on the petiole is very variable in specimens from the same locality.

15. ***Eumenes lepeleteri* var. *hottentottus*** (Saussure)

This is a melanistic variety, looking much like a typical *E. maxillosus* (de Geer); so much so, indeed, that very close examination is required to separate them. However, *hottentottus* never reaches the size of *maxillosus*, but small forms of the latter species are not uncommon. The insect is black, with a few indefinite, ferruginously tinged spots on head, antennæ, thorax, legs, abdominal petiole, and second segment. In the male, the yellow is much less extended on the head than in the *maxillosus* male, being restricted to the upper part of the clypeus and small spots under the insertion of the antennæ.

This variety is very abundant in South Africa (Cape Colony, Natal, Mozambique); it is very rare in the Congo basin, but has been recorded from the Cameroon.

Belgian Congo.—Boma, 4 ♂♂, June 1915; Stanleyville, 2 ♀♀, April 1915.

16. ***Eumenes lepeleteri* var. *stuhlmanni*** A. v. Schulthess

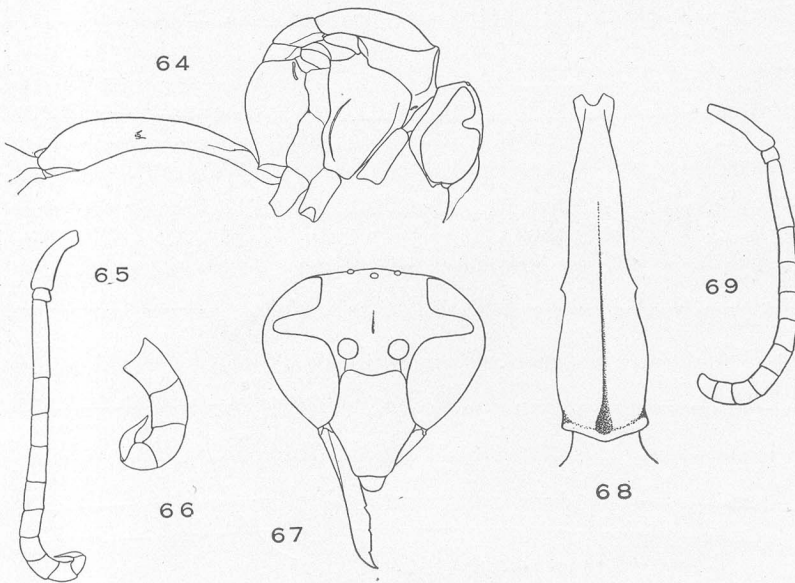
I have before me one male which I collected in the Semliki Valley (between Beni and Kasindi, north of Lake Albert Edward) and which has all the structural characters of *E. lepeleteri*. Its coloration is as follows:

Black; largely suffused with ferruginous on antennæ, mandibles, pronotum, tegulæ, mesopleura, scutellum, postscutellum, propodeum, legs, petiole, and base of the second tergite. The following parts are yellow: the clypeus; a broad spot on the front; the inner and outer margins of the eyes; the middle part of the pronotum; spots on the postscutellum and on the sides of the propodeum towards its apex; an elongate spot on each side at the apex of the petiole; an indefinite small marginal spot in the lateral edges of the second tergite; and the outer side of the front tibiæ. Wings slightly suffused with golden-yellow, the radial cell more purplish. Length (h. + th. + t. 1 + 2), 13 mm.

Apart from the presence of lateral yellow spots on the second tergite, instead of a continuous apical band, and from the more extensive ferruginous coloration of some parts of the body, this specimen agrees with the description given by A. von Schulthess¹ for his East African variety *stuhlmanni*. The yellow clypeus is a sexual difference.

***Eumenes melanosomus* Saussure**

♀.—Head (Fig. 67), as seen in front, nearly as high as broad. Clypeus distinctly longer than broad; its terminal margin straight or slightly rounded, with curved, flattened edges. Front scarcely or not elevated between the antennæ and only



Figs. 64-69. *Eumenes melanosomus* var. *decipiens* (Kirby).

Fig. 64. Head, thorax, and first abdominal segment in profile, ♀. Fig. 65. Antenna, ♂. Fig. 66. Terminal joints of antenna, ♂. Fig. 67. Head in front, ♀. Fig. 68. First abdominal tergite from above, ♀. Fig. 69. Antenna, ♀.

with a feeble indication of a longitudinal groove. Thorax (Fig. 64) short, subglobular. Mesopleura with the suture of the epimerum obsolete, the episterna not divided by a median groove, with distinct epicnemial carinae for the front legs, and furthermore with a strong and sharp carina in front of their hind margin, delimiting deep epicnemial carinae for the middle legs.² Scutellum often with a fine, smooth, longitudinal carina

¹ Soc. entomol., XXV, 1910, p. 18.

² This carina is correctly described by W. A. Schulz, *Spolia Hymenopterologica*, 1906, p. 318, for *E. melanosomus* var. *decipiens* Kirby (= *E. moseri* Schulz).

on its anterior half. Abdominal petiole (Figs. 64 and 68) strongly curved; very slender; much longer than the thorax; gradually widening from its base to its apex; its stigmata very slightly projecting laterally in the middle of its length; upper surface minutely punctate, flattened, with a longitudinal median groove which is very conspicuous towards its apex and disappears gradually towards its middle; about four times as long as broad at its apex. Second abdominal segment moderately inflated, narrowed towards its base, which is only slightly narrower than the apex of the petiole; its hind margin on the dorsal face slightly depressed and impunctate; second abdominal sternite moderately convex. Antennæ (Fig. 69)

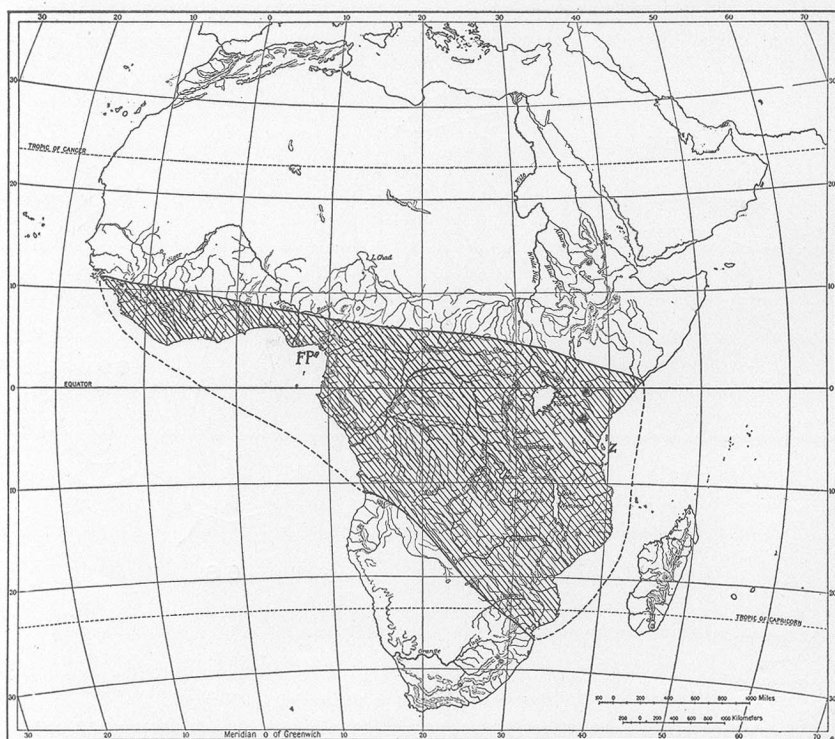


Fig. 70. Distribution of *Eumenes melanosomus* and its color varieties.

slender; scarcely inflated towards their apex; much longer than thorax and head together; all their joints distinctly longer than broad.

Length (h. + th. + t. 1 + 2), 13 to 19 mm.

♂.—Antennæ (Fig. 65) very slender; not moniliform; their terminal joint (Fig. 66) unguiform, very short, feebly curved on its middle, its basal half very broad, suddenly narrowed in a terminal sharp spine; when folded against the under side of the flagellum the apex of this hook-like thirteenth joint scarcely reaches over the middle of the eleventh joint, which presents no trace of a pit to receive it. Apical

or seventh abdominal sternite flat, without any trace of longitudinal groove. The remainder as in the female.

Length (h. + th + t. 1 + 2), 9.5 to 12 mm.

Eumenes melanosomus presents numerous color variations and occurs throughout tropical Africa from Sierra Leone to Angola and from Mt. Kilimanjaro to Lourenzo Marques; it is also found on Zanzibar and Fernando Po (Fig. 70). The species was originally described from specimens in the Museum of Paris, labelled "Java," but none of its forms are known at the present time outside the Ethiopian region.

The following key will aid only in arranging the color varieties; there are numerous intermediates between them; in fact some of the forms (e. g., *distinctus* and *æthiopicus*) intergrade.

Key to the Color Varieties of *E. melanosomus* Saussure

1. Body chiefly black, with a few ferruginous spots on head, thorax, petiole, legs, and sometimes on the second abdominal segment; yellow markings very small and pale, nearly white. Wings uniformly smoky or dark brown. . . . 2.
 Body black and ferruginous-red, with abundant bright yellow markings. Wings subhyaline, with golden-yellowish tinge. 4.
2. No yellow or white markings at all. Black, with very little ferruginous color on head, thorax, and petiole. Wings dark brown, with purplish effulgence.
aterrimus A. v. Schulthess.
 At least the apex of the first tergite (petiole) or the propodeum with a yellowish or white spot. Wings smoky. 3.
3. Abdomen black with a very narrow yellowish-white band at the apex of tergite 1 or of tergites 1 and 2, often interrupted in the middle on the second tergite. Thorax without white or yellow markings. . . . typical *melanosomus* Saussure.
 Like the preceding, but the yellowish-white markings are found on the thorax also, though variable in extension (at least two spots on the propodeum; often also markings on pronotum, postscutellum, and scutellum). Legs and head also marked with pale yellow. *decipiens* (Kirby).
4. Abdomen without yellow markings. Body black, extensively ferruginous-red on head, thorax, and the two basal abdominal segments. Head with a few yellow markings; propodeum with two large yellow spots. . *longirostris* (Gerstæcker).
 Abdomen more or less marked with yellow. 5.
5. Abdomen behind the petiole nearly entirely yellow on its dorsal face, except for a black cross with branches running over the middle of the second tergite. Very much like typical *E. lepeleterii*¹. *affinis* A. v. Schulthess.
 Abdomen only with reduced yellow markings. 6.
6. Abdomen only with two yellow spots on the apical margin of the second tergite. Thorax and head, however, very richly marked with yellow.
æthiopicus (Saussure).

¹ After A. v. Schulthess. I have not seen specimens of this form.

Most of the tergites of the abdomen with yellow apical spots; two spots of the same color on the petiole and often a spot on each side in the basal part of the second tergite.....*distinctus* (Saussure).

The ethology of this species has not been studied.

17. **Eumenes melanosomus** Saussure, typical form

The first described form, or typical *melanosomus* Saussure, has the thorax and head black, with a few ferruginous spots. Abdomen black; its first, or first and second tergite with a very narrow pale yellow apical band, which on the second tergite is often interrupted in the middle. This form was found in Spanish Guinea and is, according to A. v. Schulthess, distributed throughout Equatorial Africa.

Belgian Congo.—Only two females of the collection belong to the typical *melanosomus* Saussure. They were collected at Stanleyville and Gamangui.

18. **Eumenes melanosomus** var. *decipiens* (Kirby)

Much like the typical *melanosomus* Saussure as described above; being black, with rufous spots on head, thorax, antennæ, legs, and ventral side of the abdominal petiole, and having a narrow yellowish-white apical band on tergites one and two. In all of my specimens the band on the second tergite is broadly interrupted in the middle. The yellowish-white markings are found also on the thorax, their extension being, however, very variable; at least an indication of two lateral spots on the propodeum is always present; but some specimens may offer two or three transverse spots on the anterior margin of the pronotum, a transverse median line on the post-scutellum, and spots on the lateral margins of the scutellum. The legs are more or less extensively lined with yellowish-white, and the head presents a few spots of the same color: in the female, on the emargination and hind margin of the eyes; in the male, besides these, on part of the clypeus and on the front between the antennæ. The wings are uniformly smoky, somewhat darker with a purple effulgence in the median and radial cells.

This variety is apparently restricted to West Africa. It was known from Sierra Leone, Cameroon, Spanish Guinea, Fernando Po, and Gaboon.

Belgian Congo.—Apparently one of the common wasps. I have seen 16 ♀♀ and 11 ♂♂ from Banana, Malela, Thysville, Stanleyville, Akenge, Masisi, Lubutu, and Walikale.

19. **Eumenes melanosomus** var. *aterrimus* A. v. Schulthess

Like the typical *melanosomus* Saussure, but slightly larger. Pronotum and dorsulum distinctly, though feebly, punctate; black without any yellow markings,

but with the following ferruginous parts: mandibles, clypeus, under side of antennæ, front and hind margin of the eyes, pronotum, anterior legs, and, furthermore, propodeum and abdominal petiole more or less extensively. The wings are dark violet as in *E. marillosus*.¹

It was found in Togo, Cameroon, Nyasa, and Zanzibar; also at the foot of Mt. Ruwenzori.

Belgian Congo.—I collected one female of this extreme melanistic form on Mt. Ruwenzori (valley of the Butagu River), May 22, 1914, at an altitude of 1900 m. The collection of the Congo Expedition includes 1 female and 1 male from Stanleyville, April 1915. The specimens from Stanleyville agree with von Schulthess' description; the female from Mt. Ruwenzori is darker black, the ferruginous coloration being restricted to the mandibles and a small spot in the emargination and on the hind margin of the eyes. This specimen is the most completely melanistic *Eumenes* I have seen thus far.

20. *Eumenes melanosomus* var. *longirostris* (Gerstæcker)

This form comes next to the var. *decipiens*, though it presents a greater extension of the ferruginous-red color, which covers a large part of the clypeus, antennæ, and mandibles, and nearly the whole of the thorax, legs, and abdominal petiole. The base and two lateral spots of the second tergite are of the same color. The petiole has a broad dorsal longitudinal black stripe. The mesonotum and various ill-defined spots on the sternum, pleura, propodeum, scutellum, and postscutellum are also black. Very conspicuous is a broad triangular yellow spot on each side of the propodeum, this yellow color being furthermore only found on the clypeus, the front between the antennæ, the emargination and hind margin of the eyes. The abdomen is destitute of any yellow markings. Wings uniformly subhyaline, with a slight yellowish tint.

Belgian Congo.—The description was made after one female which I collected at Kasonsero, in the valley of the Semliki River, near the southern end of Lake Albert. It does not agree completely with the original description of Gerstæcker, but this and the two following varieties are connected by numerous intermediate color variations, so that it seems useless to increase the number of existing names by describing the Semliki specimen as new.

The var. *longirostris* Gerstæcker was previously known from East Africa (Mozambique).

¹ A. v. Schulthess, Soc. entomol., XXV, 1910, p. 18.

21. *Eumenes melanosomus* var. *æthiopicus* (Saussure)

♀ and ♂.—Black. Clypeus, front between the antennæ, a spot in the emargination and a line on the hind margin of the eyes, the whole of the pronotum, the greater part of scutellum and postscutellum, a very broad triangular spot on each side of the propodeum, a small spot on the mesopleura beneath the insertion of the wings, a terminal spot on each side of the second abdominal tergite, and a line on the outside of all the tibiæ and of the front femora, deep yellow. Antennæ, mandibles, ill-defined spots on the sides of the thorax, legs for the greater part, and under side of the abdominal petiole, ferruginous. Wings subhyaline, slightly tinged with yellow.

This variety seems to be peculiar to the Congo and Gaboon.

Belgian Congo.—Boma, Thysville, Coquilhatville, and Stanleyville. I have seen 15 ♀ ♀ and 3 ♂ ♂.

22. *Eumenes melanosomus* var. *distinctus* (Saussure)

This variety comes very near the variety *æthiopicus* (Saussure), but the yellow markings are more developed, extending on the head over the mandibles and under side of the antennal scape, and on the thorax over the greater part of the mesopleura. On the abdomen there are lateral preapical spots on the segments, even behind the second, their number being variable; the second tergite always bears a supplementary lateral yellow spot in its anterior half; one may even find a small yellow dorsal stripe on each side of the abdominal petiole.

Belgian Congo.—This variety is especially abundant in the Lower Congo district: Banana, Malela, Boma, and Kinshasa. But it is found further inland also, for I have seen specimens from Stanleyville, Yakuluku, and the Semliki River (between Beni and Kasindi). The collection includes 3 ♀ ♀ and 20 ♂ ♂.

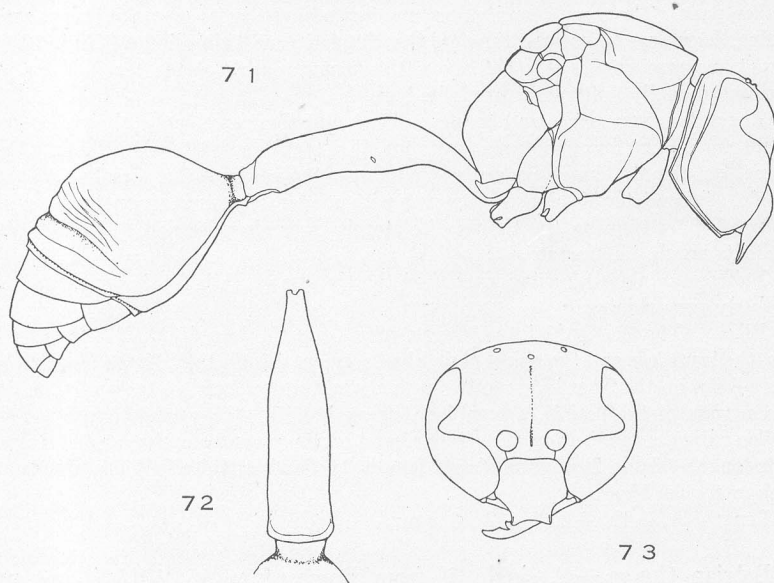
One often sees specimens which are intermediate between this and the preceding variety. They have a supplementary lateral yellow spot on the basal half of the second tergite; but the third and following segments have no yellow markings at all. They are found, together with typical *distinctus* (Saussure), at the mouth of the Congo River.

23. *Eumenes langi*, new species

♀.—Head (Fig. 73), as seen in front, distinctly broader than high. Clypeus strongly convex in its median upper part, broadly depressed near its anterior margin; moderately elongate below the insertion of the mandibles and very broadly truncate at its apex; its apical margin slightly emarginate into a broad curve, with distinctly projecting, rounded lateral edges. Vertex without fovea; distinctly swollen in front of the ocelli; with a shallow median longitudinal depression running from the anterior ocellus to the front between the insertion of the antennæ. Inner margins

of the eyes nearly twice as far from each other on the vertex as on the clypeus. Posterior ocelli more remote from each other than from the inner margin of the eyes. Vertex and temples margined behind by a continuous, sharp carina. Upper part of the temples feebly swollen behind the eyes. Mandibles elongate, beak-like; however, much shorter than the great ocular diameter, their inner margin with three, deeply cut, blunt teeth before the apex. Antennæ short, their flagellum strongly swollen towards its apical half, their joints 7 to 11 distinctly broader than long.

Thorax (Fig. 71) moderately long; subglobular; without the propodeum as long as broad or high. Pronotum broadly truncate in front, without anterior raised carina on its middle. Mesonotum with a distinct median depressed line on its anterior half, and traces of parapsidal furrows on its posterior part above the tegulæ. Scutellum well developed, convexly pillow-shaped, without carinæ or raised lines.



Figs. 71-73. *Eumenes langi*, new species.

Fig. 71. Head, thorax, and abdomen in profile, ♀. Fig. 72. First abdominal tergite from above, ♀. Fig. 73. Head in front, ♀.

Postscutellum flat, sloping. Mesopleura with a distinct suture separating the epimera from the episterna, the latter also divided in two parts by an oblique depressed line; no raised carina in front of the epinemia of the middle legs. Propodeum moderately long; deeply grooved on the middle line behind the postscutellum, the groove expanding into a small concavity above the insertion of the abdomen. Sides of the propodeum broadly rounded, without carinæ or projecting angles.

Legs normal; middle tibiæ with one apical spur; claws deeply bifid at the apex. Wing venation of the ordinary *Eumenes* type.

Abdomen (Fig. 71) elongate and slender; of distinct *Eumenes* shape; its first

segment forming a long and narrow petiole; the rest of the abdomen much inflated. Abdominal petiole (Fig. 72) long and slender, gradually broadened and thickened in its basal third, where it is distinctly curved in profile; its apical two-thirds with nearly parallel sides, slightly flattened on its dorsal face, but without any indication of a longitudinal groove; its stigmata not projecting; about as long as head and thorax (including propodeum) together and nearly four times as long as its apical width. Second abdominal segment comparatively long, scarcely shorter than the petiole, constricted at its base into a distinct neck, which, however, is only slightly narrower than the apex of the petiole. Apical margin of the second segment duplicate on its dorsal as well as on its ventral side; the extreme margin forms a very thin, more or less membranaceous, narrow, and smooth blade or lamella; in front of this lamella the integument is swollen into a continuous, blunt, transverse ridge; a deep groove presenting a row of strong punctures, separates the foliaceous from the swollen part. The second tergite presents, furthermore, in its posterior half, a series of fine, irregular, transverse ripples, the rippled zone being limited behind by a deep transverse groove situated about the posterior fifth of the tergite. Second sternite gradually flattened towards its base.

Punctuation very dense and coarse on head and thorax; clypeus almost smooth, except for a very few punctures on its middle; tegulae smooth and shining. Very strong, but remote, punctures are scattered over the whole of the dorsal face of the petiole. Second tergite densely covered with moderately strong punctures, which are much finer than on the thorax; its sternite scarcely punctate. The following segments nearly impunctate.

Pubescence almost lacking, except on the clypeus which is feebly grayish pilose; the body very shining.

Black. The terminal joints of the antennae beneath, the apical half of the mandibles, the front legs and the apical abdominal segment faintly tinged with ferruginous. A small dot on the front between the antennae, a narrow, incomplete band along the hind margin of the petiole, a preapical narrow band on the second tergite (on the swollen ridge), an indication of a similar band on the second sternite, and ill-defined spots on the front tibiae and front femora, yellowish white. Wings uniformly smoky; tegulae black.

Length (h. + th. + t. 1 + 2), 8 mm.

Belgian Congo.—A single ♀ from Boma, June 15, 1915 (Lang and Chapin Coll.).

This small species belongs to the group of *Eumenes* with duplicate posterior margin of the second segment (*Eumenidion* A. v. Schulthess — Type: *E. coarctatus* [Linné]), a group which includes many other forms from the Ethiopian region (*E. lucasius* Saussure, *E. acuminatus* Saussure, *E. braunsianus* A. v. Schulthess, *E. femoratus* A. v. Schulthess, *E. füllebornianus* A. v. Schulthess, *E. capensis* A. v. Schulthess, *E. peringyanus* A. v. Schulthess, *E. sulcigaster* Gribodo). None of the previously published descriptions mention the peculiarly rippled sculpture of the second abdominal tergite, so that I venture to describe it as new. It apparently comes near *E. lucasius* Saussure, a species which, unfortunately, I was unable to see.

Pachymenes Saussure

Generic characters.—Clypeus piriform, truncate or bidentate at its apex. Mandibles lengthened, crossing each other in an X, dentate or lobate along their inner margin. Mouth parts as in *Eumenes*, *Odynerus*, and *Nortonia*. Shape of the abdomen intermediate between that of *Eumenes* and that of *Odynerus* subgenus *Rygchium*: its first segment funnel-shaped, subcampanulate; the first tergite without any trace of transverse carina; the abdomen, as a rule, depressed. Genotype: *Pachymenes sericeus* Saussure, 1852. (Compare the discussion of the genus *Nortonia*, p. 90).

This genus is distributed in the warmer regions of the world; I do not know of any Palearctic species which can be included in it. The North American *Odynerus symmorphus* Saussure and *Nortonia tolteca* Saussure must be placed here, and the same is true for most of the species of *Nortonia* described by A. v. Schulthess.¹ For similar reasons *Eudiscælius* Friese² and *Euchalcomenes* Turner³ become synonyms of *Pachymenes* Saussure.

In the supplementary part of his Monograph,⁴ H. de Saussure has given the name *Pseudochilus* to his first division of the genus *Pterochilus* Klug. This division was characterized as follows:⁵ "Palpes labiaux grands, mais nullement plumeux, portant seulement des poils roides. Mandibules courtes. Abdomen pédicellé, le premier segment linéaire à sa base, fortement élargi et déprimé en arrière." This group can hardly be separated from *Pachymenes* Saussure. The only described species, *Pt. glabripalpis* Saussure, however, is said to have three-jointed labial palpi⁶; but this character loses much of its value when we read in the "Supplément," 1854, p. 321, that in *Pterochilus* the labial palpi very often present a rudimentary fourth joint. As I was unable to study this species, I think it best not to unite at the present time *Pachymenes* with *Pseudochilus*.

Ethology. The life history is only partly known for the South American species, *Pachymenes sericeus* Saussure,⁷ *P. ater* Saussure,⁸ and *P. pilifrons* (Kohl),⁹ which build mud nests similar to those of *Eumenes*. One of the species, *P. ater*, was found to feed its larvæ on caterpillars.

¹ Verh. k. k. zool. bot. Ges. Wien, LIII, 1903, pp. 361-365; Zeitschr. f. syst. Hym. u. Dipt., IV, 1904, pp. 270-283.

² Zeitschr. f. syst. Hym. u. Dipt., IV, 1904, p. 16.

³ Trans. Ent. Soc. London, 1908, p. 90.

⁴ Et. fam. Vesp., III, Masar., 1854, p. 321.

⁵ Et. fam. Vesp., I, Eum., 1852, p. 238.

⁶ H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 239.

⁷ E. Strand, Zool. Jahrb. Abt. f. Syst., XXXIII, 1912, pp. 307-308; G. Mantero, Ann. Mus. civ. Genova, (3), IV, 1910, pp. 539-540, Pl. iv, figs. 1 and 1 bis.

⁸ Bertoni, An. Mus. Buenos Aires, (3), XV, 1912, pp. 109-110.

⁹ F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 240.

Key to the Congo Species of *Pachymenes*

Propodeum with its lateral angles projecting on either side of the middle line into tubercles or small teeth, its dorsal areas rugosely reticulate. Punctuation on vertex and dorsal face of the thorax moderately strong and very dense. Terminal joint of ♂ antennæ (Fig. 77) slender, nearly reaching to the base of the eleventh joint.

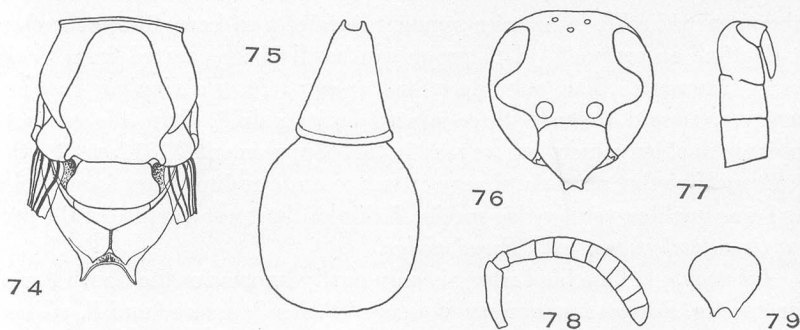
P. congensis, new species.

Propodeum broadly and convexly rounded behind, without projecting angles, its dorsal areas with scattered strong punctures. Punctuation on vertex and dorsal face of the thorax comparatively stronger, but more remote. Terminal joint of ♂ antennæ (Fig. 80) very short and small, not reaching to half way the length of the eleventh joint. *P. astutus* F. Kohl.

24. *Pachymenes congensis*, new species

Plate I, Figure 2

♀.— Head (Fig. 76) subcircular, slightly higher than broad. Clypeus piriform; scarcely broader than long; much narrowed from the base of the mandibles towards its terminal margin, which is slightly broader than the quarter of the total width of the clypeus. This apical margin of the clypeus is feebly arcuate-emarginate on its middle, its projecting lateral angles being broadly rounded; surface of the clypeus



Figs. 74-79. *Pachymenes congensis*, new species.

Fig. 74. Thorax from above, ♀. Fig. 75. Two basal abdominal tergites from above, ♀. Fig. 76. Head in front, ♀. Fig. 77. Terminal joints of antenna, ♂. Fig. 78. Antenna, ♀. Fig. 79. Clypeus, ♂.

moderately convex, flattened in the middle in its under half, without carinae. Vertex normally developed, without depressed groove behind the ocelli; distance between the eyes on the vertex one and one-fifth that on the clypeus; lateral ocelli as far from each other as from the inner margin of the eyes. Temples gradually broadening from the base of the mandibles towards the vertex, margined by a narrow raised carina which stops behind the upper angle of the eyes. Mandibles beak-like, about as long as the great ocular diameter, terminating in a curved sharp apex, their inner

margin armed with four broad obtuse teeth. No frontal carina, the space between the insertion of the antennæ scarcely raised. Antennæ (Fig. 78) inserted below the middle of the head; their scape slender but feebly curved, its length only one-third that of the flagellum; their flagellum moderately swollen towards its apex. Second joint of the flagellum distinctly shorter than joints 3 + 4; about the length of joints 5 + 6.

Thorax (Fig. 74), as seen from above, one and one-half times as long as broad. Pronotum scarcely bordered anteriorly by a slightly raised carina, which produces on the sides feeble, bluntly projecting angles; propleura with a strong vertical carina; a feebler ridge limits the epinemia of the front legs on the mesopleura. No parapsidal furrows visible on the mesonotum. Scutellum and postscutellum flat, normal; scutellum transverse, rectangular; postscutellum slightly sloping, subtriangular. Propodeum short; as seen from above, distinctly developed behind the postscutellum; broadly rounded at its sides, with a deep, but narrow, median groove starting on the hind margin of the postscutellum; its lateral angles projecting behind in a distinct tubercle or in a bluntly rounded tooth, from which a short raised carina (superior ridge of the propodeum) runs towards the median groove; its lateral and inferior ridges rounded, without carinæ. Concavity of the propodeum, behind its lateral angles, short and narrowed; very deeply excavated; divided by a raised median longitudinal ridge. The inferior part of the propodeum near the insertion of the abdomen presents on each side a very long and sharp, discolored tooth directed posteriorly. Legs and wings normal.

Abdomen (Fig. 75) elongate and narrow; its first segment nearly petiole-shaped, gradually broadening from its base to its apex. Its first tergite funnel-shaped; only slightly longer than broad at its apex; without transverse carina; scarcely depressed before its terminal margin; its lateral angles broadly rounded, not projecting. Second segment spheroidal; slightly depressed above; scarcely longer than broad; about one and one-third times as long as the first; its hind margin not depressed, though decolorate and lamelliform; second sternite strongly swollen, convexly rounded towards its base. Segments 1 + 2 distinctly longer than the thorax, as seen from above.

Punctuation on head and thorax moderately strong and dense, finer on the front. The clypeus presents only a very few scattered minute punctures; it is very finely and densely chagreened all over. Dorsal areas of the propodeum densely and rugosely reticulate. Punctuation of the abdomen much finer and more remote than on the thorax, especially on the first tergite.

Black, with the following white markings: a short transverse stripe in the midst of the base of the clypeus; a minute punctiform spot in the emargination and behind the upper angle of the eyes; a broad stripe on the under side of the scape; a short interrupted band on the median part of the pronotum; the posterior half of the tegulæ and the posttegulæ; the anterior half of the postscutellum; a narrow terminal fascia on tergite 1 and a broader one on tergite and sternite 2; a small spot in the middle of the hind margin of tergite 5, and a larger one on tergite 6; a broad stripe along the outside of the tibiæ; and a spot near the apex of the front and middle femora. Apex of mandibles and under side of flagellum ferruginous. Wings hyaline, with a smoky-purplish apex.

Length (h. + th. + t. 1 + 2), 6 to 7.5 mm.

♂.—Apart from sexual characters, much like the female. The clypeus (Fig. 79) is more strongly emarginate, its lateral teeth therefore more projecting. Antennæ

elongate, with a slender, straight, hook-like terminal joint (Fig. 77), which scarcely reaches the base of the eleventh joint when folded on the under side. White markings more extended on the base of the clypeus and on the legs, the tarsi being nearly entirely of that color; a small white spot in the middle of the end margin of the tergites 4 to 6 or 5 and 6.

Length (h. + th. + t. 1 + 2), 6 to 6.5 mm.

Belgian Congo.—This species is apparently common in the Lower Congo. The holotype is a female from Banana, September 1915 (Lang and Chapin Coll.); the allotype a male from the same locality. I have seen other specimens (paratypes) from Boma (1 ♀, 1 ♂) and Zambi (2 ♂♂), all collected in June, and from Stanleyville (2 ♀♀), April 1915.

P. congensis can be recognized *inter alia* by the shape of the clypeus, by the projecting lateral angles of the propodeum, and the terminal joints of the male antennæ. It comes near *P. astutus* (Kohl).

25. *Pachymenes astutus* (F. Kohl)

The female of this species has been completely described and figured by F. Kohl. The chief differences between it and *P. congensis*, in this sex, consist in the shape of the propodeum, which is broadly rounded behind when seen from above and, in profile, convexly curved from the post-scutellum to the insertion of the abdomen. The dorsal areas of the propodeum present only scattered strong punctures, and no reticulation; the punctation on vertex and dorsal face of the thorax is stronger than in *P. congensis*, but more remote.



80

Fig. 80. *Pachymenes astutus* (Kohl), terminal joints of antenna, ♂.

♂.—Very similar to the female, the clypeus more deeply emarginate. Antennæ slender, their two terminal joints (Fig. 80) very small, their apical joint narrow, pointed and very short, not reaching half way the length of the eleventh joint when folded beneath the latter.

Length (h. + th. + t. 1 + 2), 7.5 mm.

Belgian Congo.—Stanleyville, 3 ♀♀ and 2 ♂♂, April 1915 (Lang and Chapin Coll.).

It was originally described from Cape Colony.

Nortonia Saussure

This genus has been variously understood by different authors and, since it is apparently well represented in the Ethiopian region, it will be useful to discuss its characters and relationship. To avoid confusion, we must go back to the original description, which was published by H. de

Saussure in the *Stettiner entomologische Zeitung*, XXX, 1869, p. 53: "Caractères des *Eumenes*, mais le pétiole en entonnoir, fortement évasé; la base linéaire courte ou nulle. Formes des *Montezumia*; bouche comme chez les *Eumenes*; (type: *Odynerus intermedius* Sauss.)." This description, although very short, is sufficient in as much as it indicates the genotype. This is a well-known species distributed throughout southeastern Europe, Asia Minor, and North Africa. I have seen no specimens of it; yet I may remark that F. D. Morice's statement¹ that *O. intermedius* Saussure "has no trace of the transverse crest near the petiole" is wrong. H. de Saussure, it is true, includes the species in his "sous-genre *Leionotus*" of *Odynerus*, characterized by the "premier segment de l'abdomen sans suture transversale"; in the description,² however, it is said that the first tergite has "une saillie dorsale en dessus de sa base." Moreover, it has been shown³ that *Eumenes laminata* Kriechbaumer is a synonym of *Nortonia intermedia* (Saussure), the presence of a raised, transverse carina on the first tergite being one of the chief peculiarities of that *Eumenes*.⁴

A more complete generic description of *Nortonia* has been given by H. de Saussure in 1875:⁵

Mandibles lengthened, dentate or lobate. Lip and jaws lengthened; labial palpi composed of four articles, the first three armed with long hairs; maxillary palpi composed of six articles. Clypeus piriform, truncate or emarginate. Abdomen having its first segment retracted, funnel-shaped or subcampanulate, sub-bidentate in the middle. Metathorax short, convex, its groove shallow, flattened behind, its lateral edges distinct. The remainder as in *Montezumia*. This type establishes the transition of *Odynerus* to *Eumenes*. The organs of the mouth are almost the same as in *Eumenes* and *Odynerus*, but the body has the form to which it inclines in *Montezumia*, the first segment being funnel-shaped, not sessile, as in *Odynerus*, but not contracted into a petiole as in *Eumenes*.

Saussure includes, then, in this genus, besides the palearctic *N. intermedia*, the North American species *N. symmorpha* Saussure and *N. tolteca* Saussure, each of which has no transverse carina on the first tergite.

In Grandidier's *Histoire physique, naturelle et politique de Madagascar*, XX, pt. 1, Hym., 1890, p. 156, H. de Saussure gives only an abridged translation of his description of 1875:

Mandibules allongées, dentées ou lobées.—Labium et maxilles allongés. Palpes labiaux composés de quatre articles, palpes maxillaires de six. Abdomen plus ou

¹ Ann. Mag. Nat. Hist., (7), XII, 1903, p. 614.

² Et. fam. Vesp., I, Eum., 1852, p. 156.

³ F. Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 240.

⁴ Kriechbaumer, Ent. Nachr., V, 1879, p. 59; Ed. André, Spéc. des Hym. Eur. et Algér., II, 1886, pp. 870 and 871.

⁵ Syn. of Amer. Wasps, Smithsonian Misc. Coll., No. 254, p. 139.

moins fusiforme, ayant son premier segment rétréci à sa base, en entonnoir ou campanulé ou subpétiolé. Métathorax arrondi, un peu excavé au milieu, ses arêtes latérales seules un peu vives. Ce genre forme une sorte de passage des *Odynerus* aux *Eumenes* en ce sens que le premier segment de l'abdomen se rétrécit en forme d'entonnoir et tend à devenir pétiolé. L'habitus général est celui des insectes du genre *Montezumia*. Les caractères de la bouche et des ailes sont les mêmes que chez les *Odynerus*. Types du genre: *N. intermedia* Sauss. et *N. symmorpha* Sauss.

The newly described form, *N. schulthessiana* Saussure (*op. cit.* p. 157; Pl. xvii, fig. 8) shows no important differences from the species previously placed by Saussure in *Nortonia*, but it has no transverse carina on the first tergite.

From the preceding remarks it appears that *Nortonia*, as described by Saussure, belongs to our subfamily Eumeninæ, characterized by the elongated and beak-like mandibles, and would form a true link between *Eumenes* and *Odynerus*. The mouth parts are constructed on the same plan as in these two genera. In the shape of the abdomen, *Nortonia* is intermediate between both: its first abdominal segment is narrowed, funnel-shaped or subcampanulate. Its first tergite may or may not bear a transverse raised carina; this last character was never included in the generic diagnosis. Although the genotype possesses the carina, both H. de Saussure and A. von Schulthess have indifferently included in the genus species which do or do not present this peculiarity.

We come now, however, to the delicate problem of separating *Nortonia* Saussure from *Pachymenes* Saussure. The latter has been described as a genus in 1852¹ in the following way:

Lèvre et mâchoires comme dans la première division du genre *Eumenes*. Premier article des palpes maxillaires renflé. Mandibules très longues, grêles, un peu crochues au bout et armées de dents arrondies et tranchantes, ne formant pas un bec par leur réunion, mais se croisant en X. Tête plate. Chaperon presque aussi large que long, et terminé par deux petites dents. Yeux allongés, ne couvrant pas en entier les parties latérales de la tête; leur échancrure triangulaire. Antennes presque filiformes, insérées au milieu de la hauteur de la tête. Abdomen pédicellé, en forme de pétiole médiocrement allongé, dépourvu d'épines. Pattes postérieures atteignant ou dépassant l'extrémité de l'abdomen. Ailes très longues, arrondies au bout. Deuxième cellule cubitale variable pour la forme, son bord externe simplement arqué.

The author indicates no type, but describes five species, all from America. Ashmead² designates as genotype the first described of these species, *Pachymenes sericeus* Saussure, and this must be accepted; the same writer states that in *Pachymenes* (*op. cit.*, p. 207) the mandibles are bidentate at

¹ Et. fam. Vesp., I, Eumén., p. 73.

² Canadian Entomologist, XXXIV, 1902, p. 208.

the apex, whereas in *Eumenes* Fabricius they are said to be quadridentate; but I do not believe that this is true. I was not able to study the genotype, but in a related species, *Pachymenes pallipes* Saussure, the mandibles do not seem to be different in this respect from those of the true *Eumenes*. In a later work, H. de Saussure¹ drops *Pachymenes* as distinct genus and Zavattari, in his revision of neotropical solitary wasps,² follows this procedure.

I am not well enough acquainted with American wasps to discuss at length the relationship of *Pachymenes*, but I wish to point out that this group seems very natural and may suggest the lines along which the social *Myrapetra* White (= *Polybia* Lepeletier *sensu stricto*; *Polybia* Ducke, 1910; genotype: *Myrapetra scutellaris* White) may have originated from eumenoid solitary wasps. None of the described species of *Pachymenes* possesses a transverse raised carina on the first tergite, whereas the authors describe for *Nortonia* species with and others without such a carina; there is, however, hardly any difference to be found between the species of *Nortonia* without transverse carina on the first tergite and those of *Pachymenes*.

The resulting difficulty can be solved in two different ways, one of them being to unite both genera; *Pachymenes* Saussure, the older name, will then claim priority. But we can also bring together in *Pachymenes* all the species without a transverse carina on the first tergite (as in its genotype, *P. sericeus* Saussure); whereas *Nortonia* Saussure would then include only the species with such a carina (as in its genotype, *Odynerus intermedius* Saussure). Although good reasons can be given for each of these two procedures, I prefer to follow, at least tentatively, the latter scheme. Both of these genera may be considered as links between *Eumenes* and odyneroid wasps. *Pachymenes* might suggest the transition between *Eumenes* and the *Rygchium* group of *Odynerus* and perhaps also some of the social genera: *Myrapetra* White, *Polybioides* R. du Buysson, *Ropalidia* Guérin, etc. Whereas *Nortonia* would show the connection between *Eumenes* and *Ancistrocerus*.

It seems to me very difficult to separate *Pachymenes* from *Nortonia* in any other way. Furthermore, forms intermediate between *Odynerus* or *Ancistrocerus* and *Eumenes* are found all over the world; which may be expected from the cosmopolitan distribution of these three genera.

As a conclusion, I may summarize the characters of *Nortonia* Saussure as follows: Clypeus piriform, truncate or emarginate at its apex. Mandibles lengthened, dentate or lobate along their inner margin, crossing each other in an X. Mouth parts as in *Eumenes* and *Odynerus*, the labial palpi 4-jointed, the maxillary palpi 6-jointed. Shape of the abdomen inter-

¹ Syn. Am. Wasps, Smithsonian Misc. Coll., No. 254, 1875, p. 61.

² Arch. f. Naturg., LXXVIII, Abt. A, Heft 4, 1912, p. 77.

mediate between that of *Eumenes* and that of *Odynerus*; its first segment much narrowed and subpetiolate at its base, funnel-shaped or subcampanulate behind, with a distinctly raised, transverse carina on its tergite. The second abdominal segment at least one and one-half times to twice as broad as the apical margin of the first. Genotype: *Odynerus intermedius* Saussure, 1852.

There has apparently been some confusion between *Labus* Saussure and *Nortonia* Saussure. We have discussed at length the true characters of *Labus* Saussure (p. 41); it may be enough to repeat here that *Labus* differs chiefly by its short, obliquely truncate mandibles, closing over each other under the clypeus, and belongs therefore to the Zethinæ. Several of the Ethiopian species, described as *Labus* by F. Kohl and G. Meade Waldo, must be excluded from that genus and transferred either to *Nortonia* Saussure or to *Pachymenes* Saussure. I have attempted to do this in the list of species at the end of this paper, but the conclusion reached may not always be satisfactory for I had to rely for most of the species merely on descriptions.

Nortonia, as characterized in this paper, includes 21 species which are mostly found in the Ethiopian region. The genus is well represented in tropical Africa, the collection made in the Belgian Congo containing 8 species. A large proportion of these (4) are here described as new; undoubtedly some of them will be found, later on, to be synonyms of forms previously named. However, only the species described by Kohl can be exactly recognized and this may be an excuse for giving a full account, with new names, of the morphology of the others, so that they can easily be compared with the types of older species.

Ethology. Apparently nothing has been published with regard to the life history of any species of *Nortonia*, as the genus is here restricted. It is interesting to note that several of the African forms (*N. braunsii* Kohl, *N. bisuturalis* Saussure, and *N. acarophila*, new species) are provided with acarid chambers and similar structures will certainly be discovered in other species.

Key to the Congo Species of *Nortonia*

The following key includes, besides the species which I have seen from the Belgian Congo, also *N. aberratica* Morice and *N. soror* Kohl. It is largely based on the excellent synoptic table of *Labus* and *Nortonia* published by Kohl.¹ Since a sharp distinction between *Nortonia* and *Ancistrocerus* does not exist, the student must also compare the key and descriptions of the *Ancistrocerus* from the Belgian Congo (pp. 113-114).

¹ Denkschr. k. Akad. Wiss. Wien, math. naturw. Kl., 1907, LXXI, 1, pp. 240-248.

1. ♀ unknown. ♂.—First tergite of the abdomen with two transverse carinæ, the anterior very high, the posterior more like a suture; horizontal part of the first tergite behind the anterior carina about as long in its middle as broad at its apex, or scarcely longer. No acarid chamber in the abdomen. Second sternite with a row of longitudinal ripples on its basal neck. Anterior margin of the pronotum broadly rounded, not carinate. Terminal joint of the antennæ short, simple. Length (h. + th. + t. 1 + 2), 6 to 6.5 mm.

N. malelensis, new species.

First tergite of the abdomen with a single transverse carina; if with a trace of a posterior suture (as in some specimens of *N. bisuturalis*), then the other characters given above do not agree (*N. bisuturalis* has an acarid chamber at the base of the second tergite).....2.

2. ♂ unknown. ♀.—Propodeum with a deep, oval acarid chamber in front of its concavity. Clypeus deeply emarginate and bluntly bidentate at its apex. Anterior margin of the pronotum not carinate. Thorax elongate, much longer than broad. Postscutellum without transverse ridge. First tergite with its horizontal portion behind the transverse carina much longer than broad. Length (h. + th. + t. 1 + 2), 8 to 8.5 mm.

N. acarophila, new species.

Propodeum without a median acarid chamber above its concavity.....3.

3. Horizontal part of the first tergite (behind the transverse carina) not longer on its middle line than broad at its apical margin, or shorter (species forming the transition to *Ancistrocerus*).....4.

Horizontal part of the first tergite much longer on its middle line than wide at its apex.....7.

4. Scutellum and postscutellum with lateral, sharply raised teeth. Clypeus with broadly truncate apex; in the ♀ with three longitudinal carinæ, in the ♂ with two carinæ. First tergite comparatively short; its horizontal part about one and one-half times as broad at its apex as long on its middle line. No acarid chamber at the base of the first tergite. Length (h. + th. + t. 1 + 2), 7.5 to 8 mm.....*N. tricariculata*, new species.

Scutellum and postscutellum unarmed or only with feeble lateral tubercles. Clypeus distinctly emarginate at its apex, without carinæ or with only two feeble lateral carinæ in the ♀. First abdominal tergite longer, its horizontal part about as long on its middle line as broad at its apex.....5.

5. Pronotum with sharply raised margin. (Acarid chamber absent?). Mesonotum shorter than its largest width. Thorax black, without red spots; however, postscutellum with yellow markings; legs extensively yellow. Total length, 8 to 9 mm.¹.....*N. aberratica* Morice.

Pronotum without a sharp margin, rounded anteriorly. A deep and broad acarid chamber at the base of the first tergite, opening towards the outside in a longitudinal median groove. Mesonotum as long as its largest width. The three penultimate segments of the abdomen punctate; second sternite vertically sloping towards its basal neck which presents a row of elongate ripples.....6.

¹ After the descriptions of Kohl and Maidl, since I have not seen that species.

6. Thorax black and red. Legs for the larger part ferruginous; first or first and second tergites with lateral ferruginous spots. First tergite more elongate in the ♂ than in the ♀, almost uniformly punctate over its horizontal face. Length (h. + th. + t. 1 + 2), 6.5 to 8.5 mm.....*N. braunsii* Kohl.
 Thorax black, with red and ferruginous markings. Legs ferruginous and black. Abdomen black with narrow yellow bands at the apex of the first tergite and of the second tergite and sternite, very seldom with a small ferruginous dot on the first tergite. Anterior part of the horizontal face of the first tergite smooth, almost without punctuation. Length (h. + th. + t. 1 + 2), 6.5 to 8 mm.....*N. bisuturalis* (Saussure).
7. Mesonotum distinctly longer on the middle line than its greatest width. Clypeus about as long as wide on its middle. Horizontal face of the first tergite about one and one-half times as long as it is wide at its apical margin; the entire first tergite as seen from above being nearly as long as the mesonotum. Pronotum with a minute, sharply raised anterior margin. Base of the second sternite without row of elongate ripples. No acarid chambers. Length (h. + th. + t. 1 + 2), 5 to 7 mm.....*N. polydora* Kohl.
 Mesonotum on its middle line as long as or shorter than its greatest width...8.
8. ♂.—Second sternite abruptly sloping towards its basal neck, which bears a row of elongate ripples. Anterior margin of the pronotum rounded, without carina. A deep and broad acarid chamber at the base of the first tergite.
N. braunsii Kohl.
 Second sternite gradually flattened or feebly sloping towards its basal neck, which possesses no row of elongate ripples. Pronotum with sharply raised anterior margin.....9.
9. Horizontal face of first abdominal tergite about one and one-third times as long on its middle as broad at its apex; this apical margin very narrow, having scarcely one-third of the width of the second tergite. Thorax and first abdominal tergite very coarsely sculptured, almost reticulate; the punctuation on the second tergite very distinct, but much finer and more remote than on the first. Thorax (not including the propodeum) not longer than its greatest width. Propodeum short, vertically sloping almost behind the postscutellum. Coloration deep black, shining; two narrow, elongate spots near the apex of the clypeus and two transverse spots at the apical margin of the first tergite, ivory-yellow. No acarid chambers. Length (h. + th. + t. 1 + 2), 8 to 10 mm.....*N. morula* Kohl.
 Thorax more elongate; not including the propodeum, distinctly longer than its greatest width. Horizontal face of the first tergite about one and one-third times as long on its middle as broad at its apex; the apical margin, however, comparatively broader than in *N. morula*, nearly half as wide as the second tergite.....10.
10. ♀ unknown. ♂.—Postscutellum and part of the pronotum ferruginous; legs also ferruginous, without yellow markings. Total length, 9 to 11 mm.¹
N. soror Kohl.

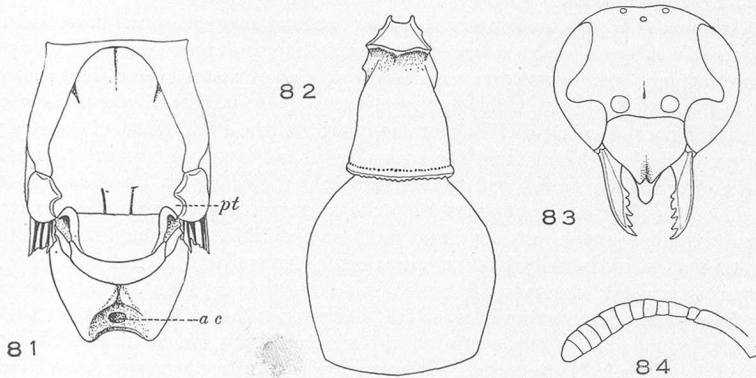
¹ After Kohl, since I have not seen that species.

♀ unknown. ♂.—Postscutellum and often the whole of the pronotum black. Legs partly yellow (on the basitarsus). No acarid chamber. Terminal hook-like joint of the antennæ small, narrow, scarcely reaching over the base of the eleventh joint. Length (h. + th. + t. 1 + 2), 6 mm.

N. fragosa Kohl.

26. *Nortonia acarophila*, new species.

♀.—Head (Fig. 83) subcircular. Clypeus transversely piriform; much broader than long; gradually narrowed from the base of the mandibles towards its apex, which is bluntly bidentate; its terminal, bidentate margin scarcely one-fifth of the total width of the clypeus. Surface of the clypeus uniformly swollen; distinctly depressed on its middle between the apical teeth; the teeth, however, not carinate. Vertex normally developed, with a shallow, broadly oval fovea behind the ocelli; distance between the eyes on the vertex one and one-third times that on the clypeus;



Figs. 81-84. *Nortonia acarophila*, new species.

Fig. 81. Thorax from above, ♀: ac, entrance to the acarid chamber; pt, posttegula. Fig. 82. Two basal abdominal tergites from above, ♀. Fig. 83. Head in front, ♀. Fig. 84. Antenna, ♀.

posterior ocelli about as far from each other as from the eyes. Temples very narrow along the lower two-thirds of the outer ocular margin, then suddenly broadened, margined by a conspicuously raised carina, which is somewhat projecting on the upper broadened portion and ends far below the upper angle of the eyes; the vertex not margined behind. Mandibles beak-like, much shorter than the great ocular diameter, with a sharp curved apex, behind which the inner margin bears four strong teeth. Frontal carina, between the insertion of the antennæ, very feeble, flattened. Antennæ (Fig. 84) inserted below the middle of the head, their scape slender, about half the length of the flagellum. Flagellum strongly swollen towards its terminal half; its second joint as long as the third plus half of the fourth. From the fifth to the eleventh, the joints of the antennæ are distinctly broader than long.

Thorax (Fig. 81) elongate; as seen from above, one and one-half times as long (including the propodeum) as broad. Anterior margin of the pronotum sharp, but without distinct raised carina, with bluntly projecting lateral angles; from each

lateral angle a strong carina descends on the propleuron. A feeble carina limits the epicnemial of the front legs on the mesopleura; this carina does not reach the middle of the mesosternum, but runs, gradually disappearing, towards the insertion of the middle coxæ. Parapsidal furrows only visible near the anterior and posterior margins of the mesonotum, broadly interrupted in the middle. Scutellum and post-scutellum flat, normal; the scutellum rectangular, the postscutellum broadly rounded behind. The lateral part of the scutellum is sloping and presents near the tegulæ a deep but narrow fovea. Propodeum moderately long, with a well developed horizontal portion behind the postscutellum, and with a shallow median groove; the apex of the propodeum is truncate, very broadly emarginate, on each side with a bluntly rounded angle; posterior face of the propodeum with a small concavity; its superior ridges rounded; the lateral and inferior ridges only very faintly raised. The triangular space between the superior ridges and the upper margin of the posterior concavity of the propodeum is depressed into a broad groove, in the center of which is the elliptic aperture of an excavation; this chamber is inhabited by small acarids and is apparently very deep; usually one of the mites is found at its entrance. Legs and wings normal. Middle tibiæ with one apical spur.

Abdomen (Fig. 82) moderately elongate; its first segment much narrowed and very shortly subpetiolate at its base; first tergite nearly funnel-shaped, with a very strong, regular, continuous transverse carina at a short distance from its base; the part in front of the carina much narrowed and sloping; the part behind the carina distinctly longer than broad (about for one-quarter of the apical width of the tergite), very gradually broadening from the carina towards the apical margin; this apical margin only slightly raised and swollen, scarcely projecting on its sides. Lateral margin of the first tergite distinctly sinuate and angulate towards the transverse carina which projects as a strong, blunt tooth on each side. Terminal margin of the first tergite narrowly lamellate and decolorate; irregularly denticulate. Second segment spheroidal; somewhat flattened on its dorsal face; about as broad as long; only feebly constricted at its base, which, however, is distinctly narrower than the apex of the first tergite; this second tergite is only slightly longer than the first and its hind margin is feebly depressed, ending in a very narrow, membranaceous lamella. Second sternite normally swollen and broadly rounded towards its base, which has no row of deep and broad punctures. Segments 1 plus 2 much longer than the thorax, as seen from above.

Head and thorax uniformly covered with strong and dense punctation, which is slightly finer on the clypeus and more remote on the scutellum and mesopleura; punctation of the abdomen much finer and more remote, the integument being shining, especially on the first tergite; the portion of the first tergite in front of the carina smooth. Pubescence very short and scarce; grayish; denser and silvery on the clypeus.

Black, with the following ivory-white markings: a punctiform spot in the emargination and behind the upper part of the eyes; the under side of the antennal scape; a small spot (with ferruginous tinge in my specimens) on each side of the middle line on the pronotum; the posttegulæ; a very narrow preapical fascia on tergite 1, and a broader terminal one on tergite and sternite 2; a stripe on the outside of all the tibiæ; and a spot near the apex of the front femora. Mandibles and front legs for the most part ferruginous. Wings subhyaline, with a distinct dark spot in the apical half of the radial cell.

Length (h. + th. + t. 1 + 2), 8 to 8.5 mm.

♂ unknown.

Belgian Congo.—Faradje, 2 ♀ ♀, December 1912 (Lang and Chapin Coll.).

This species is related to *N. polydora* Kohl and is very interesting as a new illustration of the strongly marked acarophilous structures which seem to be more common among Hymenoptera than has been generally believed.

A very similar acarid chamber has been described by R. C. L. Perkins for both sexes of the Australian *Montezumia amaliæ* (Saussure) (= *Montezumia australiensis* Perkins): "Propodeum with a deep round fossa or chamber above the abdominal articulation; on each side of the chamber is a curved carina more or less pale colored, and in lateral view forming a projecting angle of the propodeum; a shorter curved carina externally to this forms with it a less deep cavity on either side of the median chamber, and this subsidiary cavities, like the latter, are often filled with acari."¹

Labus gambiensis Meade Waldo, which must be placed in *Nortonia*, might possess a similar acarid chamber, for its description says: "median segment rounded posteriorly, a depression on the dorsal surface of the truncation."

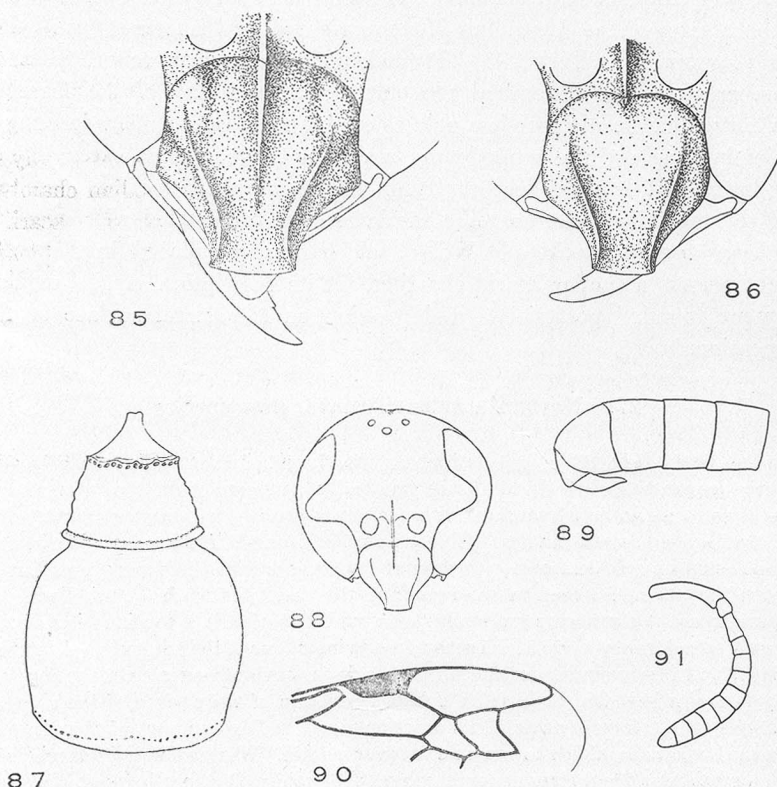
27. *Nortonia tricarinulata*, new species

♀.—Head (Fig. 88) about as high as broad; subcircular. Clypeus (Fig. 85) slightly longer than broad; piriform; gradually narrowed from the base of the mandibles to its anterior margin. This margin is broadly truncate; straight, with bluntly rounded lateral angles. Clypeus two and one-half times as wide in the middle as on its apical margin. Surface of the clypeus with three very conspicuous longitudinal carinæ: a median one runs from the base to beneath the middle of the clypeus where it disappears gradually; this median carina is a continuation of the strongly raised frontal ridge which separates the insertions of the antennæ. A lateral, oblique, and feebly sinuate carina on each side is much stronger than the median one; it begins beneath the base on a feeble elevation of the surface of the clypeus and ends in the lateral angle of its anterior margin. Median part of the clypeus depressed below the middle towards its anterior margin. Vertex normally developed; with a small, but deep, circular fovea behind the ocelli. Distance between the eyes on the vertex one and one-half times that separating the eyes on the clypeus. Posterior ocelli only slightly more remote from the eyes than from each other. Temples margined by a strong raised carina, which ends near the upper angle of the eyes, the vertex not being margined behind. Mandibles beak-like; much shorter than the large ocular diameter; terminating in a long curved blunt apex; their inner margin behind the apex with four very superficial and rounded teeth. Antennæ (Fig. 91) inserted much beneath the middle of the head, short, with a distinctly swollen

¹ Proc. Hawaiian Ent. Soc., II, No. 1, 1908, p. 33. I have seen one ♀ of *Montezumia amaliæ* (Saussure); its maxillary palpi are 5-jointed, its labial palpi 3-jointed. This species belongs therefore either in *Montezumia* or in *Parazumia*, as was recognized by G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XIV, 1915, p. 461.

flagellum; scape long, slender, slightly curved; third antennal joint as long as the fourth plus half of the fifth; from the sixth to the eleventh the joints of the antennæ broader than long.

Thorax (including the propodeum) as seen from above, one and one-half times as long as broad. Pronotum with a sharp, raised, anterior margin and slightly projecting, blunt, lateral angles. Mesopleura with a strong anterior carina limiting the



Figs. 85-91. *Nortonia tricarunculata*, new species.

Fig. 85. Clypeus, ♀. Fig. 86. Clypeus, ♂. Fig. 87. Two basal abdominal tergites from above, ♀. Fig. 88. Head in front, ♀. Fig. 89. Terminal joints of antenna, ♂. Fig. 90. Venation of front wing, ♀. Fig. 91. Antenna, ♀.

epicnemium for the anterior legs. Mesonotum without parapsidal furrows. Scutellum rectangular, long and broad, flattened; on each side near its posterior margin with a strong, short, broadly rounded vertical lamella. Postscutellum transversely triangular, with a very short anterior horizontal portion, which passes gradually to a longer sloping posterior face. On the transition between the horizontal and sloping portion, one finds on each side a very strong, vertically raised, sharp, and irregular tooth. Propodeum short, as seen from above, with a very short hori-

zontal portion behind the postscutellum; without carinæ; deeply excavated on its middle; broadly rounded and somewhat swollen on its sides; its concavity with a median raised ridge; its lateral angles rounded. Below these rounded angles begins, on each side, a short membranaceous ridge, which ends in a very long and sharp tooth placed above the articulation of the abdomen. Legs normal. Middle tibiæ with one apical spur. Wings (Fig. 90) with a trapezoidal, broadly sessile second cubital cell, the third cubital cell much higher than long; the venation nearly the same in all the four specimens (2 ♀ ♀, 2 ♂ ♂) seen.

Abdomen (Fig. 87) broad and short, its first segment strongly narrowed. Its first tergite bell-shaped, with a distinct, but irregular and moderately strong transverse carina on its anterior third; the part in front of the carina narrowed into a short petiole; the horizontal part behind the carina about one and one-half times as broad at its apex as long, gradually widening towards its apical margin, which is thickly swollen and forms on each side a blunt projecting angle. Second tergite strongly swollen; nearly as broad as long; slightly over one and one-half times as broad as the first tergite; strongly constricted at its base which is much narrower than the apex of the first tergite; its hind margin feebly raised in a somewhat discolored lamella, preceded by an irregular transverse row of deeper punctures. Second sternite strongly swollen; rounded and sloping towards its base; without tubercles or grooves; its basal neck without row of longitudinal ripples. Segments 1 plus 2 about as long as the thorax.

Punctuation strong and dense; subreticulate and nearly uniform on head, thorax, and abdominal segments 1 to 3; on the posterior abdominal segments finer and more remote; anterior sloping face of the first tergite (in front of the transverse carina) smooth and shining; clypeus without distinct punctures. Propodeum strongly and rugosely reticulate on its dorsal areas. Pubescence short, dull-silvery; long, erect, dense, and grayish on the first tergite.

Black, with ferruginous-red and yellowish-white markings. The median part of the clypeus, the mandibles, the greater part of the upper side of the scape and of the under side of the flagellum, the middle part and humeral calli of the pronotum, the tegulæ and postscutellum for the most part, spots on the sides of the propodeum, indefinite spots all over the first tergite, near the posterior margin and on the sides of tergite and sternite 2, the greater part of the front and middle legs, and a few spots on the hind legs, ferruginous. The following markings ivory-white: a transverse basal band on the clypeus; the under side of the scape; a very minute punctiform spot on the temples behind the upper half of the eyes; a terminal marginal band on tergite 1 and tergite and sternite 2, very narrow on tergite 1; a minute dot on the post-tegulæ; small spots or stripes on the coxæ, on the outside of all the tarsi, and on the outside of the front and middle tibiæ. Wings subhyaline, with darkened spots towards the end half of the radial cell and the end of the median cell.

Length (h. + th. + t. 1 + 2), 7.5 to 8 mm.

♂.—Very much like the female in shape, sculpture and coloration. Differs chiefly by the clypeus (Fig. 86) which is about as broad as long and bears only the two lateral carinæ; the median carina completely lacking. Terminal hook-like joint of the antennæ (Fig. 89) small; thick; gradually tapering towards its blunt apex, which reaches the apex of the tenth antennal joint. The pale yellow markings are more extended on the base of the clypeus and on the legs and there is an indication of a pale terminal band on tergite 3.

Length (h. + th. + t. 1 + 2), 7.5 to 8 mm.

Belgian Congo.— This species is found in the eastern part of the Congo Forest. The holotype is a female from Lubutu, January 23, 1915 (J. Bequaert Coll.); the allotype is a male from Stanleyville, April 9, 1915 (Lang and Chapin Coll.). I have seen also one female and one male from Walikale, January 1915 (J. Bequaert Coll.).

This species is closely related to *N. braunsii* Kohl, from which it may be easily distinguished by the structure of the clypeus; this character separates it also from all the African species of *Ancistrocerus*, in which it might be included just as well as in *Nortonia*, forming a transition between these two genera.

28. *Nortonia bisuturalis* (Saussure)

♀.— Clypeus broader than long; piriform; terminating in a broad apex, which is distinctly, although not profoundly, arcuately emarginate. Lateral angles of this apex distinctly projecting and bluntly rounded. A short and very feeble longitudinal carina limits near the apical margin, on each side, the median depressed part of the clypeus. Vertex normal, with a small circular fovea behind the ocelli. Distance between the eyes on the vertex about one and one-half times that between the eyes on the clypeus. Posterior ocelli about as far from each other as from the inner margin of the eyes. Temples margined by a strongly raised carina, which becomes indistinct in the upper part of the head behind the vertex. Mandibles beak-like, about as long as the great ocular diameter, with four sharp and well-developed teeth along their inner margin in front of their sharply curved apex. Antennæ inserted beneath the middle of the head, short, with a feebly swollen flagellum; scape very long, slender, strongly curved, about half as long as the flagellum; third antennal joint comparatively short, only slightly longer than the fourth.

Thorax elongate; as seen from above, without the propodeum, distinctly longer than broad. Pronotum without raised anterior margin; its lateral angles feebly projecting, blunt. Mesonotum about as long on its middle line as its largest width; with short traces of parapsidal furrows in front of the scutellum. Scutellum rectangular; large; flattened; without spines or raised lamellæ; on each side, behind the posttegulæ, with a deep pit filled with mites. Postscutellum transverse, very feebly raised, without spines or lamellæ. Mesopleura only with a very feeble, rounded and vertical ridge in their anterior part below. Propodeum comparatively short; with a distinct horizontal face behind the postscutellum; slightly grooved on its middle line. Posterior face of the propodeum nearly vertical; scarcely excavated in its upper part; but in its inferior portion, above the insertion of the abdomen, with a very deep excavation on each side of a strong median carina; both excavations being also margined behind by a very strong carina; mites are very often found in these excavations. Superior and inferior ridges, as also the lateral angles of the propodeum, rounded; the lateral ridge with a feebly raised carina. Above the articulation of the abdomen there is, on each side, a strong decolorate spine, flattened towards its base into three lamellæ and covered with long hairs. Legs normal; hind coxæ with a strong tooth on their upper face; middle tibiæ with one apical spur; claws deeply bifid at their apex. Wing venation of the ordinary *Odynerus* type.

Abdomen elongate and narrow; its second segment scarcely twice as broad as the first, this species being in this respect a transition between *Ancistrocerus* and the typical species of *Nortonia*, such as *N. morula* Kohl. First tergite bell-shaped (Fig. 92); with a very strong, irregularly sinuate, transverse carina, which is situated close to its base and followed by a row of strong longitudinal ridges; the part in front of the carina nearly vertically sloping towards the articulation of the thorax. Horizontal part of the first tergite about as long on its middle as broad at its apex. Second tergite about as broad as long, with a deep acarid chamber at its base (Fig. 93); its sternite abruptly sloping against the basal, transverse neck, which presents a row of longitudinal ripples.

Punctuation very close and strong on the head, except on the clypeus where the punctures are scattered; the inferior part of the clypeus striate. The punctuation is still stronger, but not so dense on the thorax; the dorsal areas of the propodeum are finely and rugosely reticulate. First tergite smooth in front of, and partly behind, its transverse suture; the posterior two-thirds of its horizontal face densely covered with strong punctures; very often the limit between the smooth and punctate part simulates a transverse suture, and this may have induced H. de Saussure to describe this species as possessing two transverse sutures on the first tergite.¹ Second segment with abundant, moderately strong punctures, which are more scattered on its sternite and denser on its tergite; the following segments, with the exception of the terminal one, minutely, but distinctly, punctate.

Black, with very few ferruginous and yellowish-white markings. The clypeus, mandibles, antennal scape, anterior and posterior margins of the pronotum, tegulæ, legs for the major part, a spot on the sides of tergite 1, and the terminal abdominal segments as a rule more or less, ferruginous; often the clypeus is black with ferruginous or yellow spots, and the lateral ferruginous spots on tergite 1 may be absent. The following parts are ivory-yellow: a basal stripe and two preapical spots on the clypeus, which are sometimes absent; a minute frontal spot above the insertion of the antennæ; a minute dot on the upper part of the temples; a spot in each of the anterior angles of the pronotum; the posttegulæ; two minute dots on the post-scutellum; and narrow apical bands on tergite 1 and on tergite and sternite 2. Wings hyaline, with a smoky spot in the apex of the median cell and in the apical half of the radial cell.

Length (h. + th. + t. 1 + 2), 6.5 to 8 mm.

♂.—Very similar to the female. Clypeus slightly more elongate; its apical margin very broad, slightly sinuate-emarginate; without any trace of carinæ; shining and nearly impunctate. Antennæ moderately elongate; shaped as in *N. braunsii* Kohl, ♂; their terminal, hook-like joint distinctly curved, broadly flattened and gradually tapering to an acute apex, which reaches to the middle of the tenth joint; terminal half of the tenth and the whole of the eleventh joint deeply grooved on the under side. Claws not so deeply bifid as in the female. Clypeus entirely yellow; the under side of the antennal scape and a stripe on the mandibles, of the same color.

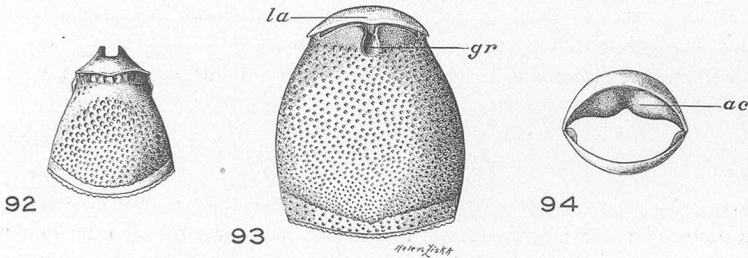
Length (h. + th. + t. 1 + 2), 6.5 to 7 mm

¹ G. Meade Waldo, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 501, has studied the type specimen in the British Museum and pointed out that *N. bisuturalis* (Saussure) presents only one transverse carina on its first tergite.

Belgian Congo.—Stanleyville, April 1915, 6 ♀♀ and 4 ♂♂ (Lang and Chapin Coll.).

This little wasp is very interesting on account of its various symbiotic relations with mites. It presents two different systems of cavities, which have apparently no other use than to shelter acarids.

1. The most conspicuous of these acarid chambers is a large cavity located on the dorsal face of the abdomen, at the articulation between its first and second tergite. When the abdomen is stretched out in its normal position so as to have its entire longitudinal axis in a straight line with the thorax, the acarid chamber is completely hidden from sight by the posterior margin of the first tergite, which glides over the basal neck of the second tergite. In bending the second segment downward at its articulation with the first, one discovers on the middle line of the short, basal neck of the



Figs. 92-94. *Nortonia bisuturalis* (Saussure).

Fig. 92. First abdominal tergite from above, ♀. Fig. 93. Second abdominal tergite, ♀, removed from its articulation with the first: *la*, basal lamella covering the acarid chamber; *gr*, elongate groove leading in the chamber. Fig. 94. Basal part of the second abdominal segment, ♀, seen in front, showing the acarid chamber (*ac*) projecting in the cavity of the abdomen.

second tergite, a small longitudinal groove or fovea leading to the acarid chamber; this chamber can be properly studied only when the second segment is removed at its basal articulation (Figs. 93 and 94). It appears then that the duplicature of the integument at the very base of the second tergite is much enlarged in this species, forming a broad and long, chitinous, somewhat discolored lamella; this lamella projects above a deep, transverse excavation of the integument at the base of the second tergite. The closed chamber thus formed is as a rule filled with numerous mites; their number may grow so large that they lift up the lamella and can then partly be seen from the outside, underneath the apical margin of the first tergite, when the second segment is bent downward. The normal entrance to the chamber seems, however, to be the longitudinal fovea (Fig. 93, *gr*) on the middle line. It must still be noted that the apical margin of the first tergite is

arcuately projecting on the middle line behind, so as to cover entirely the opening of the median fovea of the second segment when this is bent upward; as a result the presence of this acarid chamber is easily overlooked.

The size of this abdominal mite chamber is comparatively large, as can be seen in Fig. 94, showing the basal articulation of the second segment in front view; it will be noted that the chamber is slightly constricted in the middle, forming thus two pouches.

2. The usual depressions at the sides of the scutellum, behind the posttegulæ, which receive the base of the front wings at rest, are in *Nortonia bisuturalis* (Saussure) modified into deep cavities, which are as a rule densely filled with mites. It is possible that these cavities form real pouches inside the thorax.

Numerous mites are also often found filling the excavations at the apex of the propodeum in front of the strong terminal transverse carina at the articulation of thorax and abdomen; but these depressions are not such typical acarid chambers as those described above.

All these acarid chambers exist in both female and male, but seem to be better developed in the female.

A few remarks on the occurrence of acarid chambers among Hymenoptera might not be out of place, since the subject is of general interest with regard to the problem of symbiosis. The oldest known and most remarkable instance is that of the Carpenter Bees belonging to *Mesotrichia* Westwood (= *Koptortosoma* Gribodo), a subgenus of *Xylocopa* with numerous species in the Old World tropics. In these bees, the mite chamber is a voluminous pouch inside the first abdominal segment, opening on its anterior, concave face. The mites which are found in this chamber belong to three genera: *Trichotarsus* of the family Tyroglyphidæ, and *Hypoaspis* and *Paragreenia* of the family Parasitidæ.¹

Among the Vespidæ, the mite chamber of *Montezumia amalix* (Saussure) only has been completely described (p. 99). In this paper, I have recorded acarid chambers for the following African species: *Nortonia acarophila*, n. sp. (p. 98); *N. bisuturalis* (Saussure) (p. 104); *N. braunsii* Kohl (p. 106); and *Ancistrocerus kisangani*, n. sp. (p. 116). However, such structures must be rather common in this family; they are found even in some North American species. Perkins² incidentally noticed a mite chamber at the base of the second abdominal tergite in an unidentified *Odynerus* from Arizona and Mexico.

¹ A. C. Oudemans, Zoolog. Anzeiger, XXVII, 1904, pp. 137-139; R. C. L. Perkins, Entom. Monthly Mag., (2), X, 1899, pp. 37-39.

² Entom. Monthly Mag., (2), X, 1899, p. 39. N. Banks (The Acarina or Mites. U. S. Depart. of Agric. Office of the Secretary. Report No. 108, 1915, p. 84) apparently repeats Perkins' note on this wasp.

I have had, thus far, little opportunity of studying North American wasps; yet I can record the existence of acarid chambers in the following three species: *Ancistrocerus fulvipes* (Saussure), ♀ and ♂; *Odynerus conformis* Saussure, ♂ and ♀; and *Odynerus collega* Saussure, ♀ and ♂.¹ In all these the mite chamber is of the same type as in *Ancistrocerus kisan-gani*, a cavity at the base of the second abdominal tergite. The constriction at the base of this tergite is deeply depressed; its basal lamella is raised and slightly widened. The apical margin of the first tergite covers this depression completely when the abdomen is bent upward; the rather spacious cavity thus formed is entirely filled with minute mites. There is, however, no longitudinal groove on the middle line allowing the mites to enter the chamber. The whole structure is much less perfect than in *Ancistrocerus kisan-gani*, *Nortonia bisuturalis*, and *N. braunsii*.

29. *Nortonia braunsii* Kohl

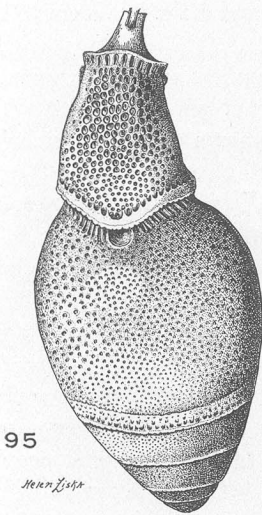


Fig. 95. *Nortonia braunsii* Kohl, basal part of the second abdominal tergite, ♀, showing the entrance to the acarid chamber as it is partly covered by the apical margin of the first tergite when the second segment is bent downward.

This species has been thoroughly studied and clearly figured by Kohl; this author, however, has overlooked the abdominal acarid chamber, which has the same position and structure as in *N. bisuturalis* (Saussure) so that it does not need to be redescribed here. Its entrance may be seen in Fig. 95, at the base of the second tergite.

N. braunsii and *N. bisuturalis* are closely related, so closely indeed that I was at first inclined to consider them as forming a single species. The following are the only differences which I am able to discover between them. (1) The shape of the first tergite, which in *N. bisuturalis* is about the same in female and male, its horizontal face being about as long on its middle as broad at its apex. In *N. braunsii* there seems to be a difference, in this respect, between the two sexes: the female has the first tergite as in *N. bisuturalis*; but in the male the horizontal face is slightly longer than

¹ These names can only be given as approximate identifications. The distinctions between the numerous North American species of *Ancistrocerus* and *Odynerus* have been made chiefly on the color. Thus correct identification, even of the common species, by the published descriptions is extremely difficult.

broad. (2) The punctation of the first tergite, which is more remote in *N. bisuturalis* and usually leaves a long, smooth space behind the suture. In *N. braunsii* the punctures are denser and also finer, and nearly completely cover its horizontal face. (3) The coloration, which is almost exclusively black and yellow in *N. bisuturalis*; whereas *N. braunsii* is extensively marked with ferruginous-red, this color also forming lateral spots on the first and second tergites.

Belgian Congo.—Boswenda, 1900 m. (north of Lake Kivu), 1 ♀, October 22, 1914; and Kasindi (north of Lake Albert Edward), 2 ♂♂, August 1914 (J. Bequaert Coll.).

I have also seen one female from Lourenço Marques (Collection of Cornell University), and 1 ♀ and 1 ♂ from Algoa Bay (Cape Colony; Dr. H. Brauns Coll.). These South African specimens are a little larger than those from the Congo, but do not present any other difference.

30. *Nortonia polydora* Kohl

This species possesses no acarid chambers of any kind. It is probably a synonym of *Odynerus heydenianus* Saussure, which is undoubtedly a *Nortonia* as I have defined the genus. The description of *O. heydenianus* agrees fairly well with my specimens of *N. polydora* Kohl.

Belgian Congo.—Stanleyville, April 1915, 4 ♀♀ and 2 ♂♂; Avakubi, October 1909, 1 ♀ (Lang and Chapin Coll.). Lubutu, January 2, 1915, 1 ♀ (J. Bequaert Coll.).

31. *Nortonia fragosa* Kohl

No acarid chamber. There hardly seems to be a distinction between this species and *N. soror* Kohl.

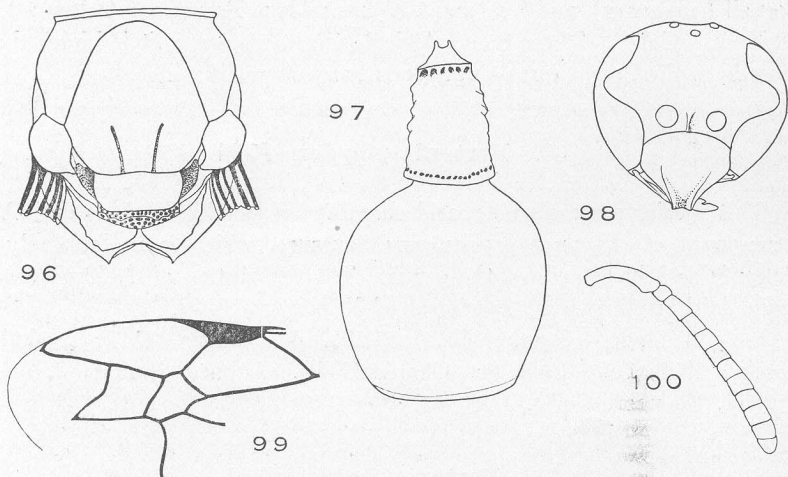
Belgian Congo.—Boma, June 10, 1915, 1 ♂ (Lang and Chapin Coll.).

32. *Nortonia morula* Kohl

♀.—Head (Fig. 98) subcircular, scarcely broader than high. Clypeus piri-form; distinctly broader than long; strongly narrowed from the base of the mandibles towards its terminal margin, the breadth of which is about one-fourth of the total width of the clypeus; this apical margin very slightly, arcuately emarginate, with broadly rounded, scarcely projecting lateral angles; a conspicuous longitudinal carina starts from each angle and runs in an oblique direction to the middle length of the clypeus. Clypeus normally convex in its upper part; depressed between the longitudinal carinae in its inferior half. Vertex normal, without depressed groove behind the ocelli; distance between the eyes on the vertex one and one-quarter that

on the clypeus; posterior ocelli slightly nearer to each other than to the eyes. Temples gradually broadening from the base of the mandibles to the vertex; margined by a strong raised carina, which is less pronounced behind the vertex. Mandibles beak-like; about as long as the great ocular diameter; terminating in a broad, blunt, and slightly curved apex; their inner margin with four broad, obtuse teeth. Front with a short, but very distinct, raised ridge between the insertion of the antennæ. Antennæ (Fig. 100) inserted on the middle of the head; their scape very slender and strongly curved, longer than one-third of the flagellum; their flagellum slender, feebly swollen towards its apex; the second joint of the flagellum only slightly longer than the third.

Thorax (Fig. 96), as seen from above, only slightly longer than broad. Pronotum margined anteriorly by a very strong raised carina; only feebly angulate on



Figs. 96-100. *Nortonia morula* Kohl.

Fig. 96. Thorax from above, ♀. Fig. 97. Two basal abdominal tergites from above, ♀. Fig. 98. Head in front, ♀. Fig. 99. Venation of front wing, ♀. Fig. 100. Antenna, ♀.

its sides. Propleura with a strong vertical carina; a similar, very strong ridge limits the epicnemial of the front legs on the mesopleura. Parapsidal furrows distinct in the posterior third of the mesonotum in front of the scutellum. Scutellum transversely rectangular; flat; separated on each side from the tegulæ by a very broad and deeply depressed groove. Postscutellum raised; with a conspicuous, but irregularly sinuate, transverse ridge, which is slightly depressed into a saddle so as to form on each side a feeble tubercle; the surface of the postscutellum, in front and behind the transverse ridge, very rugosely reticulate and punctate. Propodeum short, with a very short horizontal or slightly sloping basal portion, behind which it is abruptly vertical; with a longitudinal groove, which widens into a very deep posterior concavity. The lateral, superior, and inferior ridges of the propodeum pronounced, but not carina-shaped; its lateral angles obsolete, broadly rounded. In its apical part, the propodeum ends, on each side of the articulation of the

abdomen, in a small, but sharply projecting, decolorate tooth. Legs and wings (Fig. 99) normal. Middle tibiæ with one apical spur.

Abdomen (Fig. 97) much like that of *Eumenes*; its first segment narrow, nearly petiole-shaped, with a distinct raised transverse carina at a very short distance from its base. The horizontal face of the first tergite, behind the carina, is one and one-third times as long as broad at its apex; only slightly and very gradually broadening towards the hind margin, which is scarcely projecting and rounded at its lateral angles. The whole surface of tergite 1 is covered with a coarse, reticulately rugose punctation, which gives to the sides of the tergite, as seen from above, an irregularly serrulate appearance; the surface of this tergite is very feebly depressed before its hind margin. Second segment depressed and spheroidal; much broader and distinctly longer than the first; its base narrower than the end margin of tergite 1; its hind margin distinctly depressed, simple, not discolored, preceded by a line of deeper punctures. Segments 1 plus 2 about one and one-half times as long as the thorax, when seen from above. Second sternite broadly convex and gradually sloping towards its base, which has no row of deeper and larger punctures.

Punctation dense and coarse on head and thorax; finer on the basal part of the clypeus; the inferior depressed half of which presents a small number of oblique punctures giving it a substriate appearance. Propodeum very coarsely and reticulately rugose, even more strongly so than on tergite 1; its concavity more finely rugose. Tegulæ shining, with a few, scattered, extremely minute punctures. Punctation on tergites 2 and 3 very distinct, scattered but minute, the punctures much finer than on the thorax and sharply contrasting with the rugose sculpture of the first tergite; punctures finer and more remote on sternite 2. Pubescence grayish- or silvery-white; very long and erect on the first tergite. Nearly entirely black; the apical half of the mandibles, the under side of scape and flagellum, and the inner side of the front legs partly, ferruginous-brown; the only whitish-yellow markings are two short longitudinal lines on the terminal third of the clypeus, corresponding to the raised carinæ, and a narrow transverse spot on each angle of the apical margin of tergite 1. Wings feebly smoky, with a purplish effulgence, much darker along the costa, in the apex of the median cell, and over nearly the whole of the radial cell.

Length (h. + th. + t. 1 + 2), 8 mm.

The male was described by F. Kohl and is said to be similar to the female. Belgian Congo.—Lesse, Semliki Forest, 1 ♀, August 21, 1914 (J. Bequaert Coll.). Stanleyville, 2 ♀ ♀, March 1915 (Lang and Chapin Coll.).

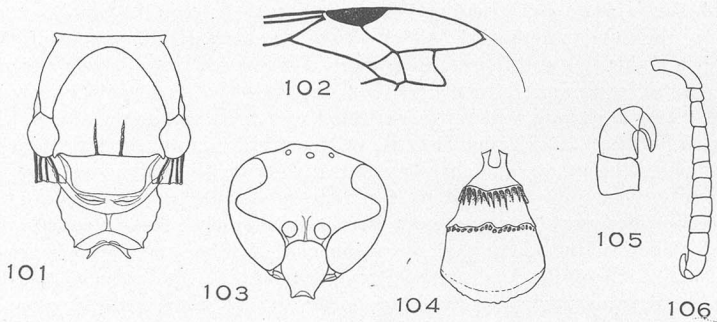
The shape and strong sculpture of the first abdominal tergite, as also the transverse carina of the postscutellum, are very striking.

33. *Nortonia malelensis*, new species

♂.—Head (Fig. 103). Clypeus about as broad as long; with a broad apical margin, ending in a wide discolored lamella, which is very feebly sinuate at its apex and has bluntly rounded lateral angles. This lamella may escape notice and the apex of the clypeus seems then to be semicircularly emarginate, with strongly projecting angles. The surface of the clypeus scarcely convex, without carinæ. Vertex

normal, without fovea; the posterior ocelli slightly more remote from each other than from the inner margin of the eyes. Temples and vertex margined behind by a very strong carina. Mandibles beak-like; distinctly shorter than the great ocular diameter; comparatively broad; with three indistinct teeth in front of their feebly curved apex. Antennæ (Fig. 106) inserted much beneath the middle of the head; long and slender, with comparatively short scape; their flagellum only moderately and very gradually swollen towards its apex; third antennal joint scarcely longer than the fourth; terminal hook-like joint (Fig. 105) small, feebly curved, flattened beneath, its blunt apex not quite reaching to the base of the eleventh joint; only the eleventh joint presents a narrow groove on its under side.

Thorax (Fig. 101), as seen from above, without the propodeum, only slightly longer than broad. Pronotum without raised anterior margin; very bluntly rounded; its lateral angles short, but rather sharply projecting. Mesonotum about as long on its middle line as its largest width; with short but deep traces of two parapsidal furrows in front of the scutellum, near its middle line. Scutellum rectangular; nearly



Figs. 101-106. *Nortonia malelensis*, new species.

Fig. 101. Thorax from above, ♂. Fig. 102. Venation of front wing, ♂. Fig. 103. Head in front, ♂. Fig. 104. First abdominal tergite from above, ♂. Fig. 105. Terminal joint of antenna, ♂. Fig. 106. Antenna, ♂.

flat; without spines or lamellæ; its lateral depressions deep, but not used as acarid chambers. Postscutellum transverse; without spines; swollen into a transverse ridge, which is slightly depressed on its middle so as to make it bituberculate. Mesopleura with a very feeble, rounded, vertical ridge on their anterior part beneath. Propodeum comparatively long, with a median horizontal face about as long as the postscutellum and only feebly depressed into a saddle on its middle line. Posterior face of the propodeum vertical, nearly flat in its upper part; with two deep terminal excavations bordered behind by a transverse carina in front of the articulation of the abdomen. These apical excavations are as well developed as in *N. bisuturalis* (Saussure), but I have not found mites in them. Lateral, inferior, and superior ridges of the propodeum forming feebly raised carinæ; its lateral angles distinct, but bluntly rounded. On each side of the articulation of the abdomen, the propodeum is prolonged behind in a strong, decolorate spine. Legs normal; hind coxæ with a strong tooth on their upper face; middle tibiæ with one apical spur; claws superficially bifid at their apex. Wing venation (Fig. 102) of the ordinary *Odynerus* type and apparently variable; the third cubital cell comparatively large.

Abdomen elongate, very slender; its second segment twice as broad as the first, undoubtedly of the *Nortonia* type. First tergite (Fig. 104) bell-shaped; with two distinct transverse carinæ, of which the anterior is, however, much stronger than the posterior. This anterior carina is very high and sharp, slightly sinuate, and placed close to the base of the first tergite; the part in front of it nearly vertically sloping towards the articulation of the thorax; it is margined behind by a row of very deep depressions, separated by elongate ripples. The posterior carina is much less pronounced, more of the shape of a transverse suture, irregularly sinuate, placed about the middle of the first tergite; it is margined behind by a row of broad, moderately deep punctures. Horizontal face of the first tergite, behind the anterior carina, about as long on its middle line as broad at its apical margin; its anterior vertical face and the portion between the two carinæ are smooth, impunctate; the part behind the posterior carina is scattered with strong punctures, except on the slightly swollen apical margin. Second segment distinctly longer than the first, slightly longer than broad, without acarid chamber at its base; its basal neck smooth on its tergite, with a row of strong longitudinal ripples on its sternite; its sternite gradually sloping towards its base.

Punctuation very dense and coarse on the head, except on the clypeus where it is very superficial and remote; its terminal decolorate lamella being impunctate. Punctuation stronger, but more remote on the thorax; the center of the scutellum and the larger part of the mesopleura smooth and shining, with very few punctures. Tegulæ impunctate and shining. Propodeum almost entirely and very coarsely, rugosely reticulate. For the sculpture of the first tergite, see above. Punctuation much finer and more scattered, but very distinct, on the second segment; still finer on segments 3 to 6.

Black, with the following pale ivory-yellow markings: the clypeus except for its basal and upper lateral margins; a stripe on the under side of the antennal scape; a spot on the outer face of the mandibles; a small dot on the front above the insertion of the antennæ; a minute dot on the upper part of the temples; a narrow apical band on tergite 1 and on tergite and sternite 2; the outer side of the front and middle tibiæ; a spot on the base of the hind tibiæ and at the apex of the front femora. In one of the specimens the apex of the posttegulæ is yellow; in the others the thorax, including the tegulæ, is entirely black, only the terminal spines at the sides of the articulation of the abdomen being decolorate and whitish. The apical hook of the antennæ and a few tinges on the legs are brownish. Wings subhyaline, smoky towards the end of the median cell and over the greater part of the radial cell.

Length (h. + th. + t. 1 + 2), 6 to 6.5 mm.

♀ unknown.

Belgian Congo.—Description based on 4 ♂♂ from Malela, July 1915. (Lang and Chapin Coll.).

This species is very distinct from all the other species of *Nortonia* known to me, in the presence of two transverse carinæ on the first tergite. It may, however, be a synonym of *Odynerus imbecillus* Saussure, which is described as having two sutures on the first tergite; but it is uncertain whether this species belongs to *Ancistrocerus* or to *Nortonia*, as defined in this paper (compare *Ancistrocerus kisangani*, p. 115).

Ancistrocerus Wesmael

While discussing the generic characters of *Odynerus* Latreille (p. 120), I have explained why I believe that *Ancistrocerus* may reasonably form a valid genus among the Eumeninæ. Considering the very large number of specific forms of the *Odynerus* type, transitions between *Ancistrocerus* Wesmael and *Odynerus* Latreille, as defined in this paper, are few in number. They are not found in Africa, but form a small group of American species which were separated by H. de Saussure¹ in a "divisio *Pseudodynerus*": in these the transverse suture of the first tergite becomes obsolete; as a rule it is completely absent on its middle line and only visible on its sides. The North American *Odynerus quadrisectus* Say is a very good illustration of this. Such species can be placed indifferently either in *Ancistrocerus* or in *Odynerus*.

Ancistrocerus is found all over the world; the species are always small or medium-sized; the total length seldom attains 15 mm. Nineteen species have been recorded from the Ethiopian region.

Ethology. The life history is known for a few species from Europe: *A. parietum* (Linné), *A. murarius* (Linné), *A. trifasciatus* (Fabricius), *A. crassicornis* (Panzer), *A. bifasciatus* (Linné), *A. callosus* (Thomson), *A. antilope* (Panzer), *A. nidulator* (Saussure), and *A. oviventris* (Wesmael); and from North America: *A. capra* (Saussure) and *A. birenimaculatus* (Saussure). It is similar to that of *Odynerus*; the prey consists of caterpillars, more rarely of larvæ of beetles or saw-flies; the clay cells are built inside cavities or galleries in succession, or they are aggregated into free mud lumps.

Ancistrocerus roubaudi (J. Bequaert) is an African species which has been studied by Roubaud² in the Sudan. The female was burrowing short and narrow galleries in the clayey wall of an old mud nest of *Synagris spiniventris*. At the entrance was built a short, straight chimney of clay. The prey consisted of caterpillars and was probably brought in hastily before the egg was hatched. Remains of a parasite, *Mesostenus tripartitus* Brullé, were found in one of the cells.

¹ Et. fam. Vesp., III, Suppl., 1854, p. 220; E. Zavattari, Arch. f. Naturg., LXXVIII, Abt. A, Heft 4, 1912, p. 237.

² Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 36 and 37.

Key to the Congo Species of *Ancistrocerus*¹

Six species have been found in the Belgian Congo: *A. massaicus* (Cameron), *A. budongo* (G. Meade Waldo), *A. lufiræ* (G. Meade Waldo), *A. neavei* (G. Meade Waldo), and two species which are described here as new, *A. kisangani* and *A. zairensis*.

1. First abdominal tergite with two transverse carinæ. Subgenus *Subancistrocerus* Saussure (= *Epancistrocerus* Dalla Torre).....2.
 First abdominal tergite with a single transverse carina. Subgenus *Ancistrocerus sensu stricto*.....4.
2. Posterior half of mesonotum and scutellum shining, almost impunctate. Posterior ocelli about as far from each other as from the inner margin of the eyes. Horizontal face of the first tergite distinctly broader at its apex than long on its middle line. Coloration black, with yellow markings; only feebly rufous on antennæ and legs; the clypeus yellow, with a large central black spot. Length ♀ (h. + th. + t. 1 + 2), 6 mm.; ♂ unknown.
A. budongo (Meade Waldo).
 Mesonotum and scutellum uniformly and coarsely punctate all over. Posterior ocelli distinctly more remote from each other than from the inner margin of the eyes.....3.
3. ♀. Horizontal face of the first abdominal tergite, behind its anterior transverse carina, much broader at its apical margin than long on its middle line (Fig. 107); second tergite without an acarid chamber. Coloration black and ferruginous with yellow markings; the clypeus, entirely, and the first abdominal segment, for the major part, ferruginous. Length (h. + th. + t. 1 + 2), 6 mm.; ♂ unknown.....*A. massaicus* (Cameron).
 ♂. Horizontal face of the first abdominal tergite as long as or slightly longer on its middle line than broad at its apical margin (Fig. 108); base of the second tergite with a deep chamber filled with mites. Coloration chiefly black, with yellow markings; the clypeus entirely yellow. Length (h. + th. + t. 1 + 2), 7.5 mm.; ♀ unknown.....*A. kisangani*, new species.
4. Third abdominal tergite minutely punctate on its sides, its middle part with a striking group of very deep and large punctures. Terminal hook-like joint of the ♂ antennæ (Fig. 115) very strong; its base with a lateral expansion; its blunt and somewhat twisted apex reaching the base of the tenth antennal joint. Clypeus very feebly emarginate at its apex, almost equally so in both sexes; without carinæ. Sides of the propodeum rounded. Length (h. + th. + t. 1 + 2), 6 to 7 mm.....*A. zairensis*, new species.
 Third abdominal tergite uniformly and minutely punctate over the whole of its apical half. Hook-like joint of the ♂ antennæ normal; in *A. neavei* (Fig. 117) small and only reaching to the base of the eleventh joint).....5.
5. Clypeus as broad as long; narrowly projecting towards its apex, which is deeply emarginate in the ♂, truncate in the ♀. Sides of the propodeum with blunt

¹ Compare the key of the species of *Nortonia*, pp. 95 to 97.

- lateral tubercles. Black; with apical bands on tergite 1 and sternite and tergite 2, spots on mandibles and clypeus and between the antennæ, and a narrow line on the anterior margin of the pronotum, yellow. In the ♂ the clypeus may be entirely yellow. Head, thorax and tergite 1 with long, erect, griseous pubescence. Wings black, with purplish effulgence, very ample. Length (h. + th. + t. 1 + 2), 9 mm. *A. neavei* (Meade Waldo).
- Clypeus as broad as long; slightly convex; narrowly projecting towards its apex, which is bidentate in ♀ and ♂; these two teeth are the termination of longitudinal carinæ, starting in the apical half of the clypeus. Propodeum with rounded lateral angles. Black; with apical bands on the abdominal segments 1 to 4, the under side of scape, the base of clypeus, a spot on the front, behind the eyes and on either side of the anterior margin of the pronotum, and the tibiæ for the larger part, yellow. Flagellum in the ♀, mandibles, apex of clypeus, tegulæ, and tarsi ferruginous. Sparse, pale pubescence all over the body. Wings hyaline, slightly fuscous in the radial cell. Total length, 8 mm. (Katanga) ¹. *A. lufire* (Meade Waldo).

34. *Ancistrocerus massaicus* (P. Cameron)

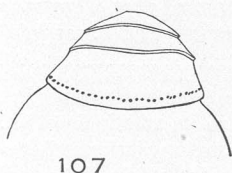


Fig. 107. *Ancistrocerus massaicus* (P. Cameron), first abdominal tergite from above, ♀.

This species possesses no acarid chamber at the base of the second abdominal tergite and can therefore be readily distinguished from the related *A. kisangani*. It was thus far only known from British East Africa. The characters given in the key separate it from its closest ally *A. budongo*. Fig. 107 shows the peculiar shape of its first abdominal tergite.

Belgian Congo.—One ♀ collected by Mr. Lang at Boma, June 15, 1915.

35. *Ancistrocerus budongo* (G. Meade Waldo)

This species is easily known by the presence of two transverse carinæ on the first tergite and the peculiar punctuation of the thorax. There is no acarid chamber at the base of the second abdominal tergite and the shape of the first tergite is very much like in *A. massaicus* (Cameron), its horizontal portion, behind the anterior transverse carina, being distinctly shorter on its middle line than broad at its apical margin.

Belgian Congo.—One ♀ from the Upper Ituri forest, Epulu River (between Penge and Irumu), February 21, 1914, altitude 700 m. (J. Bequaert Coll.), agrees in every detail with Meade Waldo's accurate description.

¹ After the description given by Meade Waldo, as I have not seen that species.

36. **Ancistrocerus kisangani**, new species

Plate I, Figure 8

♂.— Head (Fig. 109) subcircular. Clypeus nearly as broad as high; terminating in a broad apical margin, which is deeply and arcuately emarginate; its lateral angles broadly rounded; its surface without any carinæ. Vertex normally developed, without fovea; posterior ocelli slightly more remote from each other than from the inner margin of the eyes. Distance between the eyes on the vertex less than twice that on the clypeus. Temples margined by a strongly raised carina, which continues behind the vertex. Mandibles comparatively short; beak-like; much shorter than the great ocular diameter; their inner margin with three strong and sharp teeth before their apex. Antennæ (Fig. 110) inserted much beneath the middle of the head, rather elongate; their flagellum gradually, though feebly, swollen towards

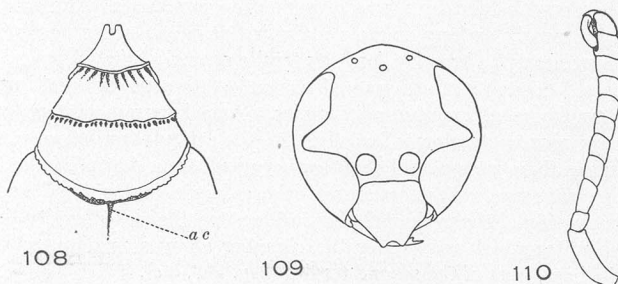
Figs. 108-110. *Ancistrocerus kisangani*, new species

Fig. 108. First abdominal tergite from above, ♂, showing the entrance (ac) to the acarid chamber. Fig. 109. Head in front, ♂. Fig. 110. Antenna, ♂.

its apex; third antennal joint only slightly longer than the fourth. Their terminal hook-like joint strong, thick and elongate, flattened on its under side and rounded above, strongly curved on its middle; its thick and very blunt apex reaching to the middle of the tenth antennal joint; the tenth and eleventh joints deeply excavated beneath.

Thorax, as seen from above (not including the propodeum), scarcely longer than broad. Pronotum without raised anterior margin, its lateral angles sharply projecting; on the sides of the pronotum a raised carina runs from these angles along their anterior margin, and in their posterior angle there is a deep fovea in front of the shoulder tubercles. Mesonotum with short parapsidal furrows near its posterior margin. Scutellum flat; normal. Postscutellum short; transverse; its anterior part raised, on each side of a feeble median furrow, into transverse and flattened tubercles. Mesopleura with a very strong vertical carina on its anterior part; the sutures dividing the episternum and separating the epimerum marked by a row of very strong and deep punctures. Propodeum comparatively long, with a distinct horizontal area behind the postscutellum; this area as long as the postscutellum itself; depressed on its middle into a deep longitudinal groove. Posterior concavity

deep. The superior ridge of the propodeum abruptly rounded; its lateral ridge distinct, but not carinate; its inferior ridge, however, forms a short, compressed and decolorate lamella between its rounded lateral angle and the strongly projecting tooth which is placed on each side of the articulation of the abdomen. Legs normal; middle tibiæ with one apical spur; claws distinctly bifid at their apex. Posterior coxæ with a very strong tooth on their upper side. Wing venation of the ordinary *Odynerus* type.

Abdomen slender and elongate. Its first segment distinctly narrower than the second, the two being separated by a strong constriction of the base of the second segment; the first segment is distinctly broader than the half of the width of the second segment; this species forms, nevertheless, a transition between *Nortonia* and *Ancistrocerus*. First tergite (Fig. 108) with two distinct, transverse carinæ. The anterior carina is very sharp and runs at a short distance from the base of the segment; the part in front of it is smooth, very rapidly, nearly vertically sloping towards the articulation of the abdomen; the posterior carina is much less pronounced and placed about on the middle of the total length of the segment; it is somewhat irregularly bordered behind by a row of very deep punctures. Horizontal part of the first tergite nearly as long on its middle line as broad at its posterior margin. Second segment nearly as broad as long, its tergite strongly inflated behind the much depressed base. Second sternite gradually rounded towards its basal furrow which presents a few traces of longitudinal ripples. Apical margin of tergites 1 and 2 forming a very narrow decolorate lamella. At the articulation between the second and first tergites there is an acarid chamber very similar to that of *Nortonia braunsii* Kohl and *Nortonia bisuturalis* (Saussure): the enlarged and inflated basal lamella covers an excavation of the neck of the second tergite; the closed cavity thus formed is filled with mites which may enter the chamber along a median, rather narrow furrow on the basal part of the second tergite (Fig. 108, *a c*).

Punctuation strong and very dense on the head; absent from the clypeus; more remote, but coarser on the thorax; the inferior part of the mesopleura with very few punctures. Propodeum very strongly and coarsely reticulate, only the inferior portion of its concavity transversely striate. Tegulæ impunctate, shining. Portion of the first tergite between the two carinæ nearly smooth, with only a few longitudinal ripples near the anterior carina; the surface behind the posterior carina densely and coarsely punctate. Punctuation much finer and more remote on the following segments, the punctures becoming stronger and closer towards the apical margin of the second tergite.

Black. Under side of the flagellum, anterior margin of the pronotum, tegulæ, and legs for the larger part, ferruginous-red. The following few markings are pale ivory-yellow: the clypeus nearly entirely; the outside of the mandibles; a frontal spot above the insertion of the antennæ; the under side of the antennal scape; a small dot in the upper part of the temples; an interrupted band on the anterior margin of the pronotum; the posttegulæ; small dots on the flattened tubercles of the postscutellum; narrow apical bands on tergite 1 and on tergite and sternite 2; and spots at the outside of the tibiæ and coxæ. Posterior basitarsus black. Wings hyaline, with a dark brown spot in the apical half of the radial cell.

Length (h. + th. + t. 1 + 2), 7.5 mm.

♀ unknown.

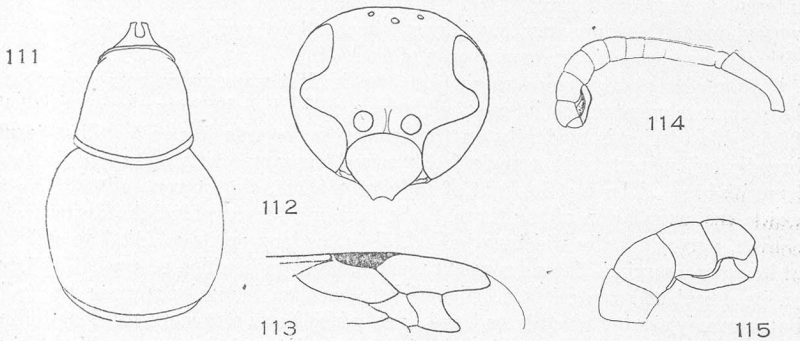
Belgian Congo.—Stanleyville, 1 ♀, April 8, 1915 (Lang and Chapin Coll.).

This species comes in the division *Subancistrocerus* on account of the two carinæ of its first abdominal tergite. It is closely related to *A. massaicus* (Cameron) of which the female alone is known, but I believe it to be distinct, owing to the presence of an acarid chamber at the base of its first tergite.

A. kisangani may prove later on to be a synonym of *Ancistrocerus* (*Subancistrocerus*) *imbecillus* (Saussure) from Sierra Leone; but this species is very superficially known and, since *A. kisangani* possesses an acarid chamber, I think it worth while to fix its identity with a description and drawings.

37. *Ancistrocerus zairensis*, new species

♀.—Head (Fig. 112). Clypeus slightly broader than long; its broad apical margin distinctly, although feebly, arcuately emarginate, without decolorate terminal lamella; with projecting, bluntly rounded angles. The surface of the clypeus: feebly convex, slightly depressed on its middle near its apical margin, but without



Figs. 111–115. *Ancistrocerus zairensis*, new species.

Fig. 111. Two basal abdominal tergites from above, ♀. Fig. 112. Head in front, ♀. Fig. 113. Venation of front wing, ♀. Fig. 114. Antenna, ♂, seen from above. Fig. 115. Terminal joints of antenna, ♂, from beneath.

carinæ. Vertex distinctly swollen, with a minute fovea; the posterior ocelli about as far from each other as from the inner margin of the eyes. Temples very broad in their upper half, rather suddenly and strongly narrowed in their inferior half; margined by a very sharp carina which becomes obsolete above and disappears almost entirely behind the vertex. Mandibles beak-like; much shorter than the great ocular diameter; their inner margin with four blunt teeth in front of their moderately curved apex. Antennæ comparatively long; their flagellum feebly and very gradually swollen towards its apical half; their third joint slightly longer than the fourth.

Thorax short and heavily built; as seen from above (without the propodeum), slightly longer than broad. Pronotum without carina in front; its anterior margin

broadly rounded; its lateral angles not projecting at all; bluntly rounded. Mesonotum distinctly longer on its middle line than its largest width; with short, superficial traces of parapsidal furrows in front of the scutellar suture near its middle line. Scutellum rectangular; nearly flat; with a feeble median depressed line; without spines or lamellæ; its lateral depressions deep, but not used as acarid chambers. Postscutellum transverse; unarmed; not swollen into a ridge nor depressed on its middle line. Mesopleura with a very feeble vertical carina in their anterior part beneath. Propodeum comparatively long; with a distinct horizontal face, which is about as long as the postscutellum and is depressed on the middle line into a saddle-like groove. Posterior face of the propodeum very abrupt; scarcely excavated, except in its terminal part in front of the apical transverse carina where there are two strong depressions separated by a median ridge; no mites were found in these terminal excavations. Lateral, inferior, and superior ridges, as well as lateral angles of the propodeum, not projecting; very gradually rounded. Two broad, decolorate, outwardly curved spines on each side of the articulation of the abdomen. Legs normal; hind coxæ with a strong tooth on their upper face; middle tibiæ with one apical spur; claws deeply bifid at the apex. Wing venation (Fig. 113) of the ordinary *Odynerus* type; the second cubital cell very strongly triangular, its inferior margin very long on the cubitus; the first recurrent ending about as far from the first intercubitus as from the second recurrent, or even farther, the first intercubitus being very oblique; this is apparent in all my specimens (3 ♀ ♀ and 3 ♂ ♂); it is also found, although less distinctly, in many species of *Nortonia*.

Abdomen (Fig. 111) moderately elongate; its first segment comparatively broad; its second segment much inflated, about one and one-half times the width of the first; this species is evidently on the transition towards *Nortonia*. First tergite broadly bell-shaped; with a single, feebly raised transverse carina at a short distance from its base. The part in front of the carina short, almost vertically sloping towards the articulation of the thorax; the horizontal face behind the carina feebly convex, very gradually widening behind, about as long on its middle line as broad at its apical margin. Second segment much inflated on its sides, somewhat flattened on its dorsal and ventral face; slightly broader than long; its sternite gradually, but convexly sloping towards its basal neck, which bears a row of short longitudinal ripples. The basal constricted neck of the second tergite has no acarid chamber, but presents a row of very strong and deep punctures, separated by elongate ripples.

Punctuation medium-sized, but very dense on the head and thorax, including tegulæ and propodeum; the clypeus also with very distinct, scattered punctures. The dorsal areas of the propodeum more rugose. Horizontal part of the first tergite of the abdomen about as densely and as strongly punctate as the mesonotum; the second segment with much finer, but still very dense, punctuation. The sides of the third, and the apical margin of the fourth and fifth tergites are very minutely punctate. This minute punctuation is broadly interrupted on the middle part of the third tergite; but one sees there, at a short distance from the apical margin, a dense group of very strong and deep punctures, which are much stronger than on any other part of the body, and very characteristic. Body covered with fine, silvery pubescence.

Black, with the following ivory-yellow markings: the clypeus except for its apical and lateral margins; a median frontal spot above the insertion of the antennæ; a minute dot on the upper part of the temples; a spot on the outer side of the mandibles; the under side of the antennal scape; a broad anterior margin of the pronotum, interrupted in the middle; a small spot at the base of the tegulæ; the posttegulæ;

a transverse band on the postscutellum; medium-sized apical bands on tergite 1 and tergite and sternite 2; the larger part of the front femora; a spot near the apex of the middle femora beneath; and the tibiæ and tarsi of all the legs. The tarsi are somewhat ferruginous towards their apex, and the terminal joint of the hind tarsi is brownish-black. Some of the yellow markings may be absent (on the tegulæ, posttegulæ, and postscutellum), and the clypeus may also present a large central black spot. Wings hyaline, brownish-dark on the apex of the median and in the apical half of the radial cell.

Length (h. + th. + t. 1 + 2), 6.5 to 7 mm.

♂.—Clypeus very similar to that of the female; its apical margin with a decolorate terminal lamella; its surface distinctly convex, with a few scattered, coarse punctures. Vertex without fovea; temples narrower above than in the female. Mandibles with three teeth in front of their apex along their inner margin. Antennæ (Fig. 114) comparatively long; their third joint distinctly longer than the fourth; joints 7 to 11 strongly inflated; apical margin of joint 9 strongly emarginate on its under side; joints 10 and 11 with a deep longitudinal groove beneath; the terminal hook-like joint (Fig. 115) long, distinctly curved, its blunt and somewhat twisted apex reaching the base of the tenth joint, its base with an expansion on its anterior margin. The remainder (including the characteristic spot of strong punctures on the middle of the third tergite) as in the female; the claws not so deeply bifid.

Coloration also very similar to that of the female; but the clypeus entirely yellow; there is a yellow stripe in the inferior part of the emargination of the eyes and the third tergite has a short yellow apical fascia. The terminal hook of the antennæ and spots at the under side of some of the other joints are dirty yellow.

Length (h. + th. + t. 1 + 2), 6 to 6.5 mm.

Belgian Congo.—Description based on 3 ♀♀ and 3 ♂♂, all from the Lower Congo district: Banana, September 1915, 1 ♀ (holotype), 1 ♂ (allotype), and 1 other ♂ (Lang and Chapin Coll.); Zambi, June 1915, 1 ♀ and 1 ♂, and Thysville, June 1915, 1 ♀ (J. Bequaert Coll.).

38. *Ancistrocerus neavei* (G. Meade Waldo)

This interesting species was described from Mt. Ruwenzori. I collected on the western slopes of the same mountain range (Butagu River, 2500 m., May 15, 1914), four ♂♂ which agree completely as regard structure and sculpture with the original description. This species, however, is also found in the mountainous region between Lake Albert Edward and Lake Kivu, as I have a male from Rutschuru (September 1914) which cannot be separated from the Ruwenzori specimens.

Meade Waldo's key is misleading¹, giving "the median segment (= propodeum) without lateral angles" for this species; the description (p. 500),

¹ Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 490.

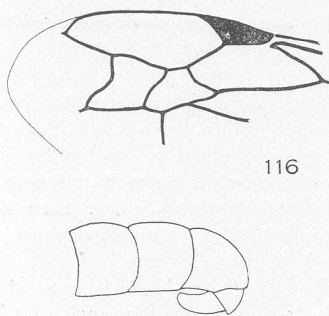
however, states correctly that the median segment has "the sides of the truncation rounded and produced to form blunt lateral tubercles."

The coloration is fairly constant, all my specimens having a narrow anterior yellowish line on the pronotum and broader yellow apical fasciæ on tergite 1 and on tergite and sternite 2; but the clypeus is often nearly entirely yellow, or adorned with a median black longitudinal band.

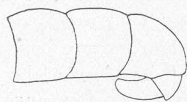
As noted by Meade Waldo, the wings are very ample, this giving a peculiar appearance to the venation (Fig. 116).

Structural differences from the related *Ancistrocerus newillei* (R. du Buysson) are not given in the original description. *A. neavei*, *A. newillei*, and *A. lineaticollis* P. Cameron are very similar and they may be only color variations of *A. zebra* (Saussure). These four "species" are all found in the mountainous regions of Central Africa

(Abyssinia, Ruwenzori, Kivu, Kilimanjaro, etc.). The number of apical bands on the abdominal segments is known to vary in *Ancistrocerus* within the limits of the same species. *A. striativentris* (Cameron) is also related to the preceding, but apparently distinct.



116



117

Figs. 116-117. *Ancistrocerus neavei*
(G. Meade Waldo).

Fig. 116. Venation of front wing, ♂.

Fig. 117. Terminal joints of antenna, ♂.

Odynerus Latreille

The classification of the Eumeninæ into genera is a most arduous task, if we attempt to give through it an approximate idea of the evolution of this group. This subfamily includes about 1900 described species, which is more than two-thirds of the total number of known diplopterous wasps. The generic or subgeneric divisions in which it has been proposed to arrange these numerous forms, are, in fact, connected by transitions in almost every direction, so that one might be induced to include all the species in a single genus: *Eumenes* Latreille. Though such a procedure has actually been suggested by so high an authority as H. de Saussure himself, it will not meet with favor among the majority of the students of Hymenoptera; it would, indeed, lead us to bring together such extremes as *Eumenes maxillosus* (de Geer) and *Synagris cornuta* (Linné). Moreover, this method does not permit any further attempt to study the relationship of the species

and the true history of the group with reference to its present and past distribution. In cases such as this, I believe that predominance must be given to the phylogenetic factor. As the Eumeninæ seem to be rapidly differentiating at the present time, it may be useful to try to discover some of the very intricate lines along which their evolution is still in progress.

From the phylogenetic point of view it is, however, evident that numerous changes will have to be made in the present classification. Above all, certain genera are entirely artificial, being based on ill-defined or very variable peculiarities of the mouth parts or of the wing venation.

There are undoubtedly certain points in the wing venation of the Eumeninæ which may be used to characterize even the genera, but they have so far not been sufficiently elucidated. I am convinced that the shape of the cubital cells is subject to a great amount even of individual variation within the limits of each species. Such genera as *Alastor* Lepeletier, which are founded exclusively on the presence of a petiolate second cubital cell, are therefore artificial, unless it be proved that they form otherwise natural groups, as seems to be the case for *Paralastor* Saussure and *Alastoroides* Saussure.

The importance of the relative shape of the joints of the maxillary and labial palpi among the Eumeninæ has been much overestimated. It is surprising how slight differences of these organs have been much used among the *Odynerus*-like forms, whereas they have been almost entirely neglected for the *Eumenes*-shaped species. As a result, the classification of the latter group is in a much better condition than that of the former.

I shall not enter into details which do not concern the African species, but I wish to propose the definite suppression of *Rygchium* as a genus distinct from *Odynerus*, since numerous Central African wasps have been referred to *Rygchium*. H. de Saussure, Kohl, and others have pointed out that this genus is so unnatural that the necessity of separating as many species as possible from the large genus *Odynerus* is the only argument for accepting it. The characters which have been used for it reside merely in the shape of the maxillary palpi: in the genotype of *Rygchium*, *Vespa oculata* Fabricius (= *Rygchium europæum* Spinola), the three basal joints are long and slender, whereas the three terminal ones are very short, being together not longer than the third. The typical species of *Odynerus* have the same number of joints (six), but these decrease gradually in length from the basal to the terminal one; the three terminal joints are together longer than the third. How striking these differences between extreme forms are, is easy to see by comparing Fig. 124, maxilla of *O. æstuans* (Saussure), with Fig. 192, maxilla of *O. sheffieldi* Meade Waldo. However, there are, in this respect, numerous transitions among the other species; in fact, most of the authors have

neglected to study the mouth parts and have placed in *Rygchium* most of the large-sized solitary wasps with a conical abdomen and the general facies of *Odynerus oculatus* (Fabricius).

In the course of my work on the African collection of the American Museum I have repeatedly tried to arrange the *Odynerus*-like Eumeninæ in natural groups, taking in account the relative length of the joints of the maxillary palpi. But I have always failed and I finally had to give it up when it became apparent that a classification based on this character separates species which are undoubtedly closely related in every other respect.

Bearing in mind the fact that no sharply defined genera can be erected among the Eumeninæ, we may nevertheless attempt to separate the most important natural groups of species. I have defined above *Pachymenes* (p. 87) and *Nortonia* (p. 93) as including all the forms which are distinctly intermediate between the typical *Eumenes* and the *Odynerus*-like solitary wasps. Among the numerous species of the *Odynerus* type, one can recognize two strains which correspond to *Pachymenes* and *Nortonia*. One of them is characterized by the presence of a transverse suture or carina on the first abdominal tergite and has been generally accepted as a subgenus of *Odynerus* under the name *Ancistrocerus* Wesmæl; it is of equal rank with *Nortonia* and if we accept the latter as a genus there is no reason why we should not do the same for *Ancistrocerus*. All the other species of *Odynerus* (including *Rygchium*) have no transverse suture on the first tergite and they must form, provisionally at least, a single genus. It has been proposed to subdivide further both *Ancistrocerus* and *Odynerus*, but the suggested divisions seem to me artificial. They are based almost exclusively on the shape and number of the joints of the antennæ, chiefly in the male. Although it is possible that some of these divisions (especially in South America) are natural groups, those occurring in the Ethiopian region can hardly claim more than subgeneric rank.

Key to the Subgenera of *Odynerus* Represented in the Ethiopian Region

Terminal joint of the antennæ in the ♂ folded underneath the apex of the flagellum; narrowed or deformed and more or less hook-shaped.

Subgenus *Rygchium* (Spinola).

Three or four terminal joints of the antennæ in the ♂ elongate and narrowed; rolled up in spiral fashion. Subgenus *Odynerus*, *sensu stricto*.

Of the 221 species which have been recorded from the Ethiopian region, after elimination of the most obvious synonyms, 185 belong to *Rygchium*, and only 11 to *Odynerus*, *sensu stricto*; the remaining 25 species are so unsatisfactorily described that it is impossible to bring them into the subgenera to which they belong.

It must be remembered that I have transferred to *Pachymenes* several species which were formerly included in the subgenus *Rygychium* (= *Leionotus*) of *Odynerus*. Species with narrowed first abdominal segment must, therefore, be looked for in *Pachymenes*.

Ethology. Réaumur¹ gives an interesting account of the nesting habits of *O. reniformis* (Gmelin) and, since his time, various writers have contributed many details to the life history of this genus. Some 60 species of *Odynerus* have been more or less completely studied in this respect, but most of the observations relate to forms from the Palearctic region.

Although all of the species keep true to the solitary habits, their instincts show considerable plasticity. There is, in the location of the nest especially, a great variability. Some species, such as the common European *A. parietum* (Linné), seem to adopt almost any suitable cavity. Often there is a marked preference for galleries, which the female burrows herself or finds ready for use, in stalks, reeds, dry wood, in cavities of stones, in empty snail shells, etc. In all such cases, the partitions between the cells and also the wall closing the entrance to the nest are made of mud, masoned with saliva and water; sometimes complete clay cells are built inside these cavities. Numerous species burrow directly in clayey or sandy soil and very often the entrance to the nest is then surmounted by a clay chimney. Some of the larger *Odynerus* build free mud cells, either isolated or aggregated into lumps, and fixed on twigs of shrubs, or on stones; such species are apt to use empty mud nests of other Hymenoptera.

The egg is always laid in the bottom of the cell before the prey is brought in; it may be free or hang down from a silky thread. In most of the species, the female accumulates the prey hastily in the cell and walls it up before the egg hatches; however, at least in one instance (*O. tropicalis* Saussure), the mother wasp is known to feed her larva from day to day until it is full-grown.

The prey consists, in most cases, of lepidopterous, sometimes of coleopterous larvæ; these are, as a rule, paralyzed by a sting, exceptionally they are partly crushed by the mandibles. In a few instances it has been recorded that species of *Odynerus* store larvæ of saw-flies.

The ethology of the following African species is at least partly known: *O. marginellus* (Fabricius), *O. anceps* (Gribodo), *O. auro-maculatus* (Saussure), *O. hyacinthæ* Gribodo, *O. hottentotus* Saussure, *O. falcatus* Tullgren, *O. bellatulus* Saussure, and *O. tropicalis* Saussure. More details of the habits of some of them can be found in this paper.

¹ Mémoires pour servir à l'histoire des Insectes, VI, Paris, 1742, p. 251.

Subgenus **Odynerus**, *sensu stricto*

(= *Oplopus* Wesmael, *Oplomerus* Westwood, *Hoplomerus* Thomson.)

Eleven African species have been referred to this subgenus, the type species of which is *Odynerus spinipes* (Linné). Several of them, however, are only known in the female sex and, since the subgenus is almost exclusively characterized by the shape of the male antennæ, the knowledge of the African *Odynerus, sensu stricto* is still in a very unsatisfactory condition.

The only species recorded from the Belgian Congo is *Odynerus adonis* G. Meade Waldo, from the Katanga (Lufira River). It is placed by its author in *Odynerus, sensu stricto* (= *Hoplomerus*), though the male is unknown. I have not seen that species. It is described as being black, with yellow spots on head, thorax, basal abdominal segment, and apical margin of first and second tergites; and also with the first and second tergites and the legs for the most part ferruginous. Vertex with golden, and propodeum with ivory-white, pubescence. Wings golden hyaline. Propodeum slightly concave. Length (h. + th. + t. 1 + 2), 16 mm.¹

The transition between the subgenus *Odynerus, sensu stricto*, and the subgenus *Rygchium* is very gradual. Some of the African species have the male antennæ so shaped as to be intermediate between these two groups. Such are: *O. andreas* Saussure, described as having the male antennæ "un peu recoquillées à l'extrémité et terminées par un crochet obtus,"² *O. angolensis* Radoszkowsky (p. 135), *O. picturatus* n. sp. (p. 137), and others. I have included these all in the subgenus *Rygchium*.

Subgenus **Rygchium** (Spinola)

(= *Leionotus* H. de Saussure; *Lionotus*, auct.)

In the key given in this paper, I have tried my best to avoid characters based on the coloration, because they are absolutely misleading. Notwithstanding this warning, some students may still attempt to name species after some striking color markings. For this reason, I present here a grouping of some of the most common color combinations found among the African species of *Odynerus* and I have included the similarly colored species of the genus *Synagris*. I hope that these lists, which are far from complete,

¹ Compare my remarks on *Pterochilus versicolor* A. v. Schulthess, p. 194.

² H. de Saussure, in Grandidier, Hist. nat. Madagascar, XX, pt. 1, Hym., 1890, p. 168; R. du Buysson, Ann. Soc. ent. France, LXIX, 1900, p. 178, figs. 10 and 11.

will sufficiently prove how little use can be made of the coloration for an exact identification of the species.¹

I. Group of *Synagris crassipes* Kohl.—Body almost entirely of uniform black color. At most a few ferruginous tinges on head, antennæ, tegulæ, and legs; or, in the male, the clypeus and spots on the face yellowish.

* *Synagris crassipes* Kohl.

“ *aterrima* Maidl.

* “ *cornuta* (Linné) var. *similis*, new variety.

“ *similis* Maidl.

Odynerus holomelas (Ed. André).

“ *junodianus* (A. v. Schulthess).

“ *fallax* (Saussure).

“ *luctuosus* (Gerstæcker).

“ *lugubris* Meade Waldo.

“ *madecassis* (Saussure).

“ *melanchrous* Kohl.

II. Group of *Synagris calida* (Linné).—Abdomen black; with the apical segments, from the third or fourth on, bright orange-yellow or orange-red, often with golden pubescence. Thorax and head black, or more or less tinged with ferruginous.

* *Synagris abyssinica* Guérin.

* “ *analis* Saussure.

* “ *calida* (Linné).

“ *carinata* Saussure.

“ *elephas* Ern. André.

* “ *kohli* Maidl.

“ *maxillosa* Saussure.

“ *negusi* R. du Buysson.

* “ *spiniventris* (Illiger).

“ *spinosuscula* Saussure.

“ *vicaria* Stadelmann var. *luteopicta* Maidl.

* *Odynerus anceps* (Gribodo).

“ *ardens* Guérin.

“ *forticulus* (Kohl).

“ *incensus* (Gribodo).

“ *magretti* (Gribodo).

“ *natalensis* Saussure.

“ *sirdari* (Morice).

¹ Species of which I have seen specimens are marked with an asterisk; the others are included in the lists after their descriptions.

* *Odynerus synagroides* (Saussure).

* " *ventralis* Saussure.

" *xanthurus* Saussure.

III. Group of *Synagris mirabilis* Gerstæcker.—Head and thorax black; antennæ, clypeus, and mandibles more or less tinged with ferruginous. Abdomen black, with the three or four apical segments entirely or partly white or ivory-white.

* *Synagris abyssinica* Guérin var. *albofasciata* Maidl.

* " *mirabilis* Gerstæcker.

" *proserpina* Gribodo.

" *vicaria* Stadelmann.

Odynerus junodi (Gribodo).

" *lacuum* (Stadelmann).

IV. Group of *Synagris æstuans* (Fabricius).—Abdomen black, with conspicuous, but small, ivory-white or yellowish-white, rounded spots, at least on tergites 1 and 2—sometimes on nearly all the tergites. Legs, antennæ, clypeus, pronotum, propodeum, ventral side of the thorax, and base of the abdomen more or less extensively ferruginous-red. The thorax also may present ivory-white rounded spots.

* *Synagris æstuans* (Fabricius).

" *huberti* Saussure.

" *ornatissima* Maidl.

" *versicolor* A. v. Schulthess var. *meade-waldoi* Maidl.

* *Odynerus æstuans* (Saussure).

* " *osborni*, new species.

V. Group of *Synagris cornuta* (Linné), typical form.—Head for the most part, thorax except for the mesonotum, legs, and basal part of the first abdominal segment ferruginous-red. Mesonotum and remainder of the abdomen black.

* *Synagris cornuta* (Linné), typical form.

* " *huberti* Saussure var. *clypeata* (Mocsáry).

* " *rufopicta* Tullgren.

* " *versicolor* A. v. Schulthess.

Odynerus inermis (Mocsáry).

" *mephisto* (Gribodo).

" *niloticus* (Saussure).

* " *rufoniger*, new species.

" *uncatus* (Tullgren).

VI. Group of *Odynerus carinulatus* Saussure.—Abdomen entirely, or at least on its dorsal face, bright orange-brown or yellow, often covered with golden pubescence. Head and thorax black, more or less suffused with ferruginous, sometimes with yellow or whitish spots.

Odynerus bairstowi Gribodo.

- " *bothriogaster* Schletterer (? = *carinulatus* Saussure).
- * " *carinulatus* Saussure.
- " *caviventris* Kirsch.
- * " *emeryanus* Gribodo (= *benitensis* A. v. Schulthess).
- * " *ferruginatus* J. Bequaert (= *ferrugineus* A. v. Schulthess).
- " *guerinii* Saussure (= *æstuans* Saussure).
- " *guineensis* Saussure, 1858.¹
- * " *hyacinthæ* Gribodo (? = *Vespa aurata* Fabricius
- " *meade-waldoi* J. Bequaert (= *deceptor* Meade Waldo).
- " *politiclypeus* A. v. Schulthess.
- " *signatus* Saussure.
- * *Rhynchalastor fuscipennis* Meade Waldo.
- " *xanthosoma* (Schletterer).

Odynerus chrysomallus (Schletterer) is described as having the dorsal part of the abdomen covered with dense golden pubescence, but the ground color is said to be black.

VII. Group of *Odynerus marginellus* (Fabricius).—Abdomen black or brownish, with two conspicuous yellow lateral bands. Thorax and head more or less black and brown.

- * *Odynerus gestroi* (Gribodo).
- * " *lateralis* (Fabricius).
- * " *marginellus* (Fabricius).
- * " *pseudolateralis* Meade Waldo.

The following species, belonging to the subgenus *Rygchium*, have been previously recorded from the Belgian Congo. They were not represented in the collection which was used in preparing the present paper and, since the descriptions of most of them are very incomplete, it has not been possible to include them all in the key.

Odynerus bothriogaster Schletterer.—Equator, Congo.²

" *chrysomallus* (Schletterer).—Equator, Congo.³

" *goniodes* Schletterer — Equator, Congo.⁴

" *politiclypeus* A. v. Schulthess.—Bunkeya (Katanga)⁵; has been included in the key.

Odynerus schubotzianus (A. v. Schulthess).—Upper Ituri.⁶ See the footnote in the key, p. 134.

¹ *Odynerus guineensis* Saussure, 1863, is a completely different wasp.

² A. Schletterer, Ann. Soc. entom. Belgique, XXXV, 1891, p. 27.

³ A. Schletterer, Ann. Soc. entom. Belgique, XXXV, 1891, p. 23.

⁴ A. Schletterer, Ann. Soc. entom. Belgique, XXXV, 1891, p. 25.

⁵ A. v. Schulthess, Soc. entom., XXIX, 1914, p. 73.

⁶ A. v. Schulthess, Wiss. Ergebn. D. Z. Afrik. Exp. 1907–08, IV, Zool., II, pt. 10, 1912, p. 293.

Odynerus versicolor (Kirby).—According to A. v. Schulthess,¹ *O. wellmani* Meade Waldo and *O. stiraspis* Cameron are synonyms of this species; the same author brings *O. stiraspis* Cameron in the group of *O. floricola*, with postscutellum and propodeum rounded;² the abdomen is said to be impunctate. Meade Waldo³ brings *O. wellmani* among the species without lateral tubercles on the postscutellum; whereas *O. stiraspis* is found twice in his key: once in the same group as *O. wellmani* and also in the group of species with tuberculate postscutellum. *O. wellmani* Meade Waldo has been recorded from the Lualaba River, Katanga.⁴

Key to the Congo Species of *Odynerus*, Subgenus *Rygdium*

G. Meade Waldo has recently published a key to the species of *Odynerus* occurring in the Ethiopian region.⁵ However, this attempt does not seem to be very successful; the characters given are to a great extent based on the color markings and there are also other defects which render this key unsatisfactory.

1. Mesonotum with two longitudinal carinae or raised lines, which are sometimes rather inconspicuous. Postscutellum prominent; with a short horizontal and a much longer vertical portion, the transverse ridge between them raised, presenting on each side a lateral crenulate tubercle and on its middle a projecting tooth, which is the termination of a more or less distinct longitudinal carina. 2.
- Mesonotum without any trace of longitudinal carinae or raised lines. The postscutellum not trituberculate and not of the shape described above. . . . 4.
2. Mesonotum with only two very conspicuous, raised carinae, which converge slightly posteriorly but do not reach the scutellum. Clypeus distinctly emarginate at its apex with projecting lateral edges. Abdomen mostly impunctate but with a transverse area of coarse punctures near the apical margins of tergites 2, 3, and 4. Middle femora in the ♂ only slightly depressed on their anterior face in their basal half. Second sternite with a deep, saddle-like depression, margined by strong longitudinal ridges. Head, thorax, and legs dark brownish-ferruginous, with indistinct black spots; the abdomen uniformly orange-chrome. Clypeus of the ♂ yellowish-white. Length (h. + th. + t. 1 + 2); ♀, 11 to 13 mm.; ♂, 8.5 to 10 mm.

O. carinulatus Saussure.

Clypeus broadly truncate at its apex in both sexes. Abdomen uniformly punctate all over. Anterior face of the middle femora in the ♂ with a strong

¹ Soc. entom., XXIX, 1914, p. 57.

² Ark. f. Zool., VIII, No. 17, 1913, p. 17.

³ Trans. Entom. Soc. London, (1914), pt. 3-4, 1915, pp. 490-498.

⁴ G. Meade Waldo, Ann. Mag. Nat. Hist., (8), VI, 1910, p. 106.

⁵ G. Meade Waldo, A revision of the species of the genus *Odynerus* occurring in the Ethiopian region. Trans. Entom. Soc. London, (1914), pt. 3-4, 1915, pp. 485-520, Pl. xci.

basal depression bordered by a ridge. Black, with indefinite ferruginous tinges on head, thorax, and legs; terminal abdominal segments bright orange-brown. Clypeus at least partly ferruginous in the ♂.....3.

3. Mesonotum with two longitudinal, distinct, raised lines, somewhat carina-like and converging towards the scutellum; often also with a shorter, more or less developed, third raised line on its middle. Second sternite with a deep saddle-like depression, margined by strong ridges, which suddenly slope towards the base of the segment. Projecting part of the middle femora, ♂, situated about their middle. Hook of the antennæ, ♂, (Figs. 147 and 148) long, heavy, and twisted at its apex. Length (h. + th. + t. 1 + 2): ♀, 17 to 20 mm.; ♂, 15 to 18 mm.....*O. ventralis* Saussure.

Two raised longitudinal lines on the mesonotum, much less distinct than in *O. ventralis*, the median line very feeble or obsolete. Second sternite with a shallow median depression, the lateral ridges being low and very gradually sloping towards the base. Projecting part of the middle femora, ♂, situated on their basal third. Hook of the antennæ, ♂, (Fig. 160) shorter, not twisted, somewhat spatulate. Length (h. + th. + t. 1 + 2): ♀, 14 to 17 mm.; ♂, 12 to 14 mm.....*O. anceps* (Gribodo).

4. Mesonotum distinctly punctate in its anterior half; its posterior half, scutellum, and tegulæ smooth and shining, almost without sculpture. Scutellum plane. Postscutellum with a broad, but short anterior face, which is feebly depressed towards its middle and raises on each side into a feeble, blunt tubercle. Inferior margin of propodeum with a row of digitiform teeth. Apex of the clypeus in the ♀ narrow, almost truncate, with two short carinæ; in the ♂ very feebly emarginate, without carinæ. Abdomen distinctly punctate all over.....5.

Mesonotum and scutellum almost uniformly punctate all over, at least not divided into a distinct anterior punctate and posterior smooth part. The structure of the postscutellum also different.....6.

5. Body with an abundant short pubescence, which is deep black on vertex, pronotum, and mesonotum; grayish or silvery-white on the rest of the body; the abdomen covered with a distinct, silvery bloom. In the var. *sabulosus* (Saussure), body almost entirely black, without yellow markings; head, tegulæ, and legs partly ferruginous. Length (h. + th. + t. 1 + 2), ♀, 15 mm.....*O. cyanopterus* (Saussure).

Body almost naked or scarcely pubescent; the abdomen without silvery bloom. In the typical form the head, thorax and legs are extensively marked with ferruginous-red; the abdomen is black with two conspicuous yellow lateral bands on its dorsal face. Length (h. + th. + t. 1 + 2): ♀, 12.5 to 15 mm.; ♂, 9 to 14 mm.....*O. marginellus* (Fabricius).

6. Middle femora in both sexes (Fig. 173) with a distinctly swollen expansion on their anterior margin in their apical third, as seen from above. Mandibles in the ♂ with a heavy tooth-like lamella on their inner margin near their base. Apical joints of the antennæ in the ♂: Fig. 172. Head, thorax, and legs black; the postscutellum in both sexes and the clypeus in the ♂, yellow or ivory-white; the abdomen orange-brown, densely covered with bright golden tomentum. Length (h. + th. + t. 1 + 2), ♀ and ♂, 11 mm.

O. hyacinthæ Gribodo.

- Middle femora not with an apical expansion on their anterior margin. Species otherwise different. 7.
7. Propodeum with a distinct, although often short, horizontal area behind the postscutellum; the postscutellum not bordering the concavity of the propodeum. This horizontal area is more or less fissurate on its middle line. . . . 8.
- Propodeum without any horizontal area behind the postscutellum; the postscutellum itself bordering the concavity of the propodeum in front. 10.
8. ♂ unknown. ♀.—Clypeus flat, shining, impunctate, truncate at its apex. Thorax blackish-brown; abdomen almost entirely orange-brown, nearly impunctate. Length (h. + th. + t. 1 + 2), 12 mm.¹
- O. politicypeus* A. v. Schulthess.
- Clypeus distinctly sculptured in the ♀. Abdomen distinctly punctate. Coloration very different. 9.
9. Clypeus piriform, almost of the same shape in ♀ and ♂, its apical margin broadly truncate, very feebly sinuate on its middle; its apical half with two longitudinal carinae, which are more pronounced in the ♀ than in the ♂. Propodeum very long, with a deep and distinct concavity, its inferior ridge with a row of deeply cut teeth. Second sternite feebly depressed on its middle. Hook of antennae ♂: Fig. 219. Black; head and thorax tinged with ferruginous-red; no yellow markings; clypeus of ♂ ferruginous. Length (h. + th. + t. 1 + 2): ♀, 10.5 to 11.5 mm.; ♂, 9 to 11 mm.
- O. histrionimimus*, new species.
- ♀ unknown. ♂.—Clypeus transverse, with truncate apical margin, without longitudinal carinae. Propodeum comparatively short, its inferior ridge feeble, without a row of teeth. Second sternite convex on its middle. Hook of antennae ♂: Fig. 225. Black, with a few ferruginous tinges and distinct yellow apical bands on tergites 1 and 2; clypeus yellow. Length (h. + th. + t. 1 + 2), 6.5 mm. *O. rhizophorarum*, new species.
10. Postscutellum with sharply projecting lateral tubercles or spines. 11.
- Postscutellum without projecting tubercles, teeth, or carinae; either flat, or convexly rounded, or swollen into a transverse ridge, which may be sharp, rounded, or crenulate and is often depressed on its middle so as to present two rounded protuberances. 13.
11. Basitarsus of the hind legs in the ♂ with a distinct expansion on its inner side. Postscutellum, ♀ and ♂, with small, transverse tubercles, which are flattened from behind. Scutellum flat, with a very feeble elevation on each side in its hind angles. Second abdominal tergite often with a trace of a longitudinal median ridge, or slightly raised on its middle line. Dorsal areas of the propodeum punctate, but not reticulate. 12.
- Basitarsus of the hind legs in the ♂ normal, straight along its inner side. Postscutellum, ♀ and ♂, with rather long and sharp lateral teeth, which are somewhat flattened from the sides; the scutellum often with lateral carinae or spines. Second abdominal tergite convexly rounded above, without any trace of a median ridge. Punctuation of the clypeus strong; the clypeus, however, not distinctly striate in the ♀. Dorsal areas of the propodeum rugosely reticulate. Coloration variable. Length (h. + th. + t. 1 + 2): ♀, 6.5 to 8 mm.; ♂, 5 to 7 mm. *O. tropicalis* Saussure.

¹ After A. v. Schulthess.

12. Clypeus, ♀ and ♂, nearly impunctate. Basitarsus of the hind legs, ♂, (Fig. 207) with a rather strong expansion before its middle. Antennal hook ♂: Fig. 206. Punctuation coarse on the thorax, much finer on the head. Length (h. + th. + t. 1 + 2): ♀, 6.5 mm.; ♂, 6 mm. *O. kabarensis*, new species.
- Clypeus, ♀, with scattered, strong punctures, giving its surface a substriate appearance; distinctly punctate in the ♂. Basitarsus of the hind legs, ♂, (Fig. 212) with a feeble expansion about its middle. Antennal hook ♂: Fig. 211. Punctuation uniformly coarse on head and thorax. Length (h. + th. + t. 1 + 2): ♀, 6.5 to 7 mm.; ♂, 6.5 mm.
- O. chapini*, new species.
13. Superior ridges of the propodeum sharp, somewhat carina-shaped; its lateral and inferior ridges, as also its blunt lateral angles, well marked; its dorsal areas almost entirely taken by a smooth impunctate, shining spot; its concavity transversely striate. Postscutellum with a short horizontal and a much longer vertical part, both being separated by an almost straight, finely crenulate ridge; a slight notch separates this ridge from the superior ridge of the propodeum. First and second abdominal tergites with a few distinct, but very scattered punctures in their posterior half; those on tergites 3 and 4 denser. Shape of the clypeus in ♀ and ♂, and of the antennæ in the ♂, the same as in *O. lateralis* Fabricius. Coloration black and white; see p. 179. Length (h. + th. + t. 1 + 2): ♀, 10 to 11 mm.; ♂, 7.5 to 9 mm. *O. falcatus* Tullgren (= *14-maculatus* A. v. Schulthess).
- Superior, lateral, and inferior ridges of the propodeum, as also its lateral angles, convexly rounded and indistinct; if sharp, then the dorsal areas of the propodeum uniformly sculptured, without smooth space. Punctuation of the two first abdominal tergites also different — either practically absent, or much denser. 14.
14. Abdominal tergites 1 and 2 practically impunctate; at most the second tergite with very few scattered punctures on its posterior part or on its sides. 15.
- Abdominal tergites 1 and 2 distinctly punctate all over, often with a zone of strong and dense punctures in their apical part; sometimes the punctuation hidden beneath a covering of short pubescence. Dorsal areas of the propodeum uniformly sculptured, without smooth space. 21.
15. Clypeus, larger part of the front, and often also vertex practically without strong sculpture, impunctate, dull in both sexes; at most, traces of punctures in the apical half of the clypeus. 16.
- Clypeus, front, and vertex distinctly punctate in both sexes, the sculpture of the clypeus more coarse in the ♀ than in the ♂. Antennæ of the ♂ with their terminal joint always hook-shaped, short and straight. 19.
16. Antennæ of the ♂ not very elongate; not rolled up at their apex (Fig. 187); their last joint hook-like, straight. Apical margin of the clypeus, ♀ and ♂, very feebly, arcuately emarginate; its angles without sharp carinæ. 17.
- Antennæ of the ♂ elongate; somewhat rolled up at their apex; their last joint long and strongly curved (Figs. 119 and 122). Apical margin of the clypeus in the ♀ (so far as known) deeply emarginate, with sharply carinate angles. 18.
17. Punctuation of the thorax very superficial, more distinct on the posterior part of the scutellum; the mesonotum dull, almost without visible sculpture.

Temples and emargination of the eyes also impunctate; the second sternite with very minute punctures. Length (h. + th. + t. 1 + 2), 8 to 10 mm.

O. bellatulus Saussure.

Thorax uniformly covered with strong, although distinctly separated punctures; temples and emargination of the eyes with a few punctures. Second sternite strongly punctate. Clypeus ♀: Fig. 185; and ♂: Fig. 184. Hook of antennæ ♂: Fig. 187. Length (h. + th. + t. 1 + 2): ♀, 10 mm.; ♂, 8 mm.

O. ueleensis, new species.

18. ♀ unknown. ♂.—Apical margin of the clypeus broad, truncate, very feebly sinuate, its minal angles being very bluntly rounded (Fig. 123). Mesonotum with coarse, distinct punctation all over. Length (h. + th. + t. 1 + 2), 9.5 mm.....*O. picturatus*, new species.

Apical margin of the clypeus in both ♀ and ♂ deeply, semicircularly, or triangularly emarginate, with rather sharp angles (Figs. 118 and 121). Mesonotum dull; with superficial, scattered punctures. Length (h. + th. + t. 1 + 2): ♀, 12 mm.; ♂, 10 to 12 mm....*O. angolensis* Radoszkowsky.

19. Inner margins of the eyes about as far from each other on the vertex as on the clypeus; the posterior ocelli slightly more remote from each other than from the inner margin of the eyes. Vertex, ♀, with a broad, densely hairy fovea. Clypeus, ♀, with very strong, almost rugosely striate sculpture on its middle; in the ♂ deeply, semicircularly emarginate at its apex. Postscutellum very sharply divided into a horizontal and a vertical part, the ridge separating both strongly marked, almost straight, crenulate. Lateral, superior, and inferior ridges of the propodeum rather strongly convex; its lateral angles also distinct; its superior ridge separated from the ridge of the postscutellum by a feeble notch. Coloration variable. Length (h. + th. + t. 1 + 2): ♀, 9.5 to 11 mm.; ♂, 7 to 9.5 mm.....*O. lateralis* Fabricius.

Inner margins of the eyes distinctly more remote on the vertex than on the clypeus; posterior ocelli about as far from each other as from the inner margin of the eyes. Vertex, ♀, with a small, feebly hairy fovea. Clypeus, ♀, with much feebler sculpture; in the ♂ (so far as known) very feebly emarginate at its apex. Postscutellum convexly pillow-shaped, with a median, arcuately curved, crenulate ridge. Ridges of the propodeum very gradually sloping, its lateral angles rounded, almost indistinct.....20.

20. ♂ unknown. ♀.—Apical margin of the clypeus slightly, although distinctly, arcuately emarginate, with sharp lateral edges in which end fine longitudinal carinae. Postscutellum with a distinct and regular, arcuate and crenulate, raised line. Dorsal areas of the propodeum almost gradually sloping towards its concavity. Second abdominal sternite almost flattened towards its base. Coloration black, with ivory-white markings; a free lateral spot near the base of the second tergite; with very few ferruginous tinges. Length (h. + th. + t. 1 + 2), 9.5 to 10.5 mm.....*O. alboniger*, new species.

Apical margin of the clypeus only very slightly sinuate, with bluntly rounded edges, which are hardly carinate. Raised, crenulate line of the postscutellum less distinct; the dorsal areas of the propodeum still distinctly separated from its concavity. Second abdominal sternite convexly rounded at its base. Coloration black, with abundant ferruginous tinges and pale yellow markings; no free lateral spot on the second tergite. Length (h. + th. + t. 1 + 2): ♀, 9 to 10 mm.; ♂, 7.5 to 8 mm.....*O. desperatus*, new species.

21. Lateral, superior, and inferior ridges of the propodeum indistinct; its lateral angles also broadly rounded; its inferior ridges never crenulate. Clypeus broadly truncate at its apex, at most very slightly sinuate in the ♂. Medium-sized species of the ordinary *Odynerus* shape. Length (h. + th. + t. 1 + 2), scarcely over 10 mm. 22.
- The ridges and lateral angles of the propodeum more or less distinct; often the superior ridges carina-like; or the inferior ridges are crenulate, with long, digitiform teeth, or with a recurved spine. Species often over 10 mm. long. 24.
22. Clypeus broader than high, shining, with very scattered and minute punctures, without striæ. Second abdominal sternite uniformly convex towards its base, without a median furrow. Head and thorax black, with a few ivory-yellow markings; abdomen and the greater part of the legs ferruginous-red, without yellow markings. *O. emeryanus* Gribodo.
- Clypeus either coarsely punctate, or distinctly higher than broad. Second abdominal sternite with a distant, longitudinal furrow in the middle of its basal, convex part. Various colored with black and ferruginous; with abundant yellow markings, forming spots on head and thorax, transverse bands and often also isolated spots on the abdomen. 23.
23. Clypeus about as broad as high, feebly convex, uniformly and densely covered with coarse punctures. Punctuation of head, thorax, and abdomen also stronger and denser than in the following species, especially on the dorsal areas of the propodeum and the second sternite. Hook of the ♂ antennæ short and scarcely curved (Fig. 195). Coloration probably variable. *O. congolensis*, new species.
- Clypeus distinctly higher than broad, slightly flattened towards its apex, with scattered punctuation in its upper part; its flattened, inferior part being shining, only feebly punctate and somewhat striate. Second tergite with feeble punctures all over and a preapical zone of stronger pits; the second sternite with feeble, scattered punctuation. Hook of the ♂ antennæ long, distinctly curved on its middle, and slightly twisted. Coloration variable. *O. sheffieldi* G. Meade Waldo.
24. ♂ unknown. ♀.—Superior ridges of the propodeum convexly rounded; almost without separation between its dorsal areas and its concavity. Post-scutellum transversely triangular, pillow-shaped; regularly sloping from its base to its apex; without distinct transverse ridge; uniformly rugose all over. Teeth on the inferior ridges and lateral angles of the propodeum, feeble; however, two strong recurved spines above the valvula, near the articulation of the abdomen (Fig. 175). Clypeus, ♀: Fig. 174. Coloration much as in *S. cornuta* (typical form): black, with head, thorax, legs and first abdominal segment extensively ferruginous-red. Length (h. + th. + t. 1 + 2), 13 to 14 mm. *O. rufoniger*, new species.
- Superior ridges of the propodeum distinct, forming a fine raised line, a sharp carina, or a lamella. Postscutellum more or less distinctly divided into a horizontal, anterior and a vertical or sloping, posterior portion. No strong, recurved spines above the valvula near the articulation of the abdomen. 25.
25. Superior ridge of the propodeum lamelliform, with a projecting upper angle, which is separated by a deep notch from the well marked, transverse, crenu-

- late ridge of the postscutellum. Clypeus, ♀ and ♂, with a narrow, very feebly sinuate apical margin; in the ♀ uniformly covered with dense irregular striae; in the ♂ coarsely punctate. Second sternite not depressed on its middle; with a distinct, longitudinal, basal furrow. Medium-sized species, rarely over 10 mm. long (h. + th. + t. 1 + 2).....26.
- Superior ridge of the propodeum more or less distinct, never lamelliform, the notch between it and the transverse ridge of the postscutellum very feeble or absent, not followed by a projecting angle. Second sternite often depressed on its middle; never with a distinct, basal, longitudinal furrow. Larger species; rarely under 10 mm. long; *Synagris*-like¹.....27.
26. Coloration much as in *O. lateralis* and *O. marginellus*. In the only ♀ specimen seen, body almost entirely ferruginous-brown, with a broad, continuous, yellow stripe on each side of the dorsum of the abdomen. Tegulae mostly whitish. Wings subhyaline, with a yellowish tinge in their basal half, purplish-black in their apical half. Length (h. + th. + t. 1 + 2), ♀, 9 mm.
O. pseudolateralis G. Meade Waldo.
- ♀ Coloration much as in *Synagris cornuta* (typical form) and *O. rufoniger*: black; with the larger part of the head, antennae, pronotum, scutellum, postscutellum, upper part of propodeum, spots in the upper half of the mesopleura, tegulae, sides of tergite 1, apex of abdomen, and legs, ferruginous-red; second tergite with an apical whitish band, broadly interrupted on its middle. Rarely the first or third tergites also whitish in their apical angles. The ♂ similar, but the clypeus and a broad spot on the front are pale yellow. Wings yellowish and purplish-brown as in the preceding species. Length (h. + th. + t. 1 + 2): ♀, 10 to 11 mm.; ♂, 8 to 9 mm.
O. meyeri var. *albolimbatus* A. v. Schulthess.
27. ♀ and ♂.—Postscutellum very rugosely reticulate; its rounded transverse ridge strongly crenulate. Second sternite flattened or feebly depressed on its middle. Clypeus, ♀, with its apical margin very narrow, feebly, although distinctly, arcuately emarginate, with projecting, strongly carinate edges; its whole surface rugosely punctate. Clypeus, ♂, deeply semicircularly emarginate, with sharp teeth-like edges, its surface very minutely sculptured. Hook of antennae, ♂: Fig. 136. Middle femora, ♂, flattened in their basal third on their inner side (Figs. 141 and 142). Black, clypeus ferruginous, terminal abdominal segments bright chrome-orange. Length (h. + th. + t. 1 + 2): ♀, 15 to 19 mm.; ♂, 9 to 15 mm.....*O. synagroides* (Saussure).
- ♀ (♂ not seen).—Clypeus with narrowly truncate, very feebly sinuate apical margin (Fig. 126) and broadly rounded edges. Postscutellum feebly, rugosely punctate; its transverse ridge indistinct or minutely crenulate. Coloration very different.....28.
28. Second abdominal sternite with a broad, shallow, median depression, margined by convexly rounded elongate ridges. Postscutellum almost without trans-

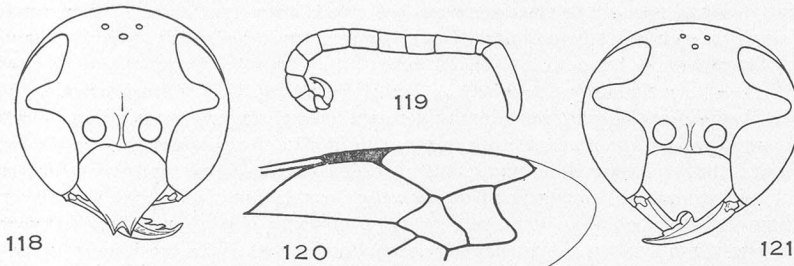
¹ According to the description, *O. schubotzianus* (A. v. Schulthess) is a large-sized, *Synagris*-like species (Length: ♀, 16 mm.; ♂, 13 mm., to the apex of tergite 2), with a very high, crenulate lamella along the inferior ridge of the propodeum; clypeus as broad as (♂) or broader than (♀) long, with broadly truncate, scarcely sinuate apical margin. Body entirely black; the front wings fusco-violaceous in their anterior half, hyaline in their posterior half; the hind wings hyaline. Second sternite deeply depressed on its middle.

verse ridge; convexly rounded between its horizontal and its sloping portion. Dorsal areas of the propodeum coarsely punctate, almost rugosely reticulate. Black; clypeus, antennæ, pronotum, pleura, propodeum, base of the first segment, and legs ferruginous-red; bright ivory-white spots on front, sides of pronotum, tegulæ, postscutellum, and sides of tergites 1 and 2. Length (h. + th. + t. 1 + 2), ♀, 16 to 18 mm. *O. æstuans* (Saussure). Second abdominal sternite only slightly flattened on its middle; without a distinct depression. Postscutellum with a distinct transverse ridge separating its anterior, horizontal from its posterior sloping part; the latter almost vertical. Dorsal areas of the propodeum finely rugulose. Black; clypeus, antennæ, pronotum, tegulæ, legs, and spots on the mesopleura ferruginous-red; regular, rounded, whitish spots on front, posttegulæ, dorsal areas of propodeum, and sides of tergites 1 to 5. Length (h. + th. + t. 1 + 2), ♀, 13 mm. *O. osborni*, new species.

39. *Odynerus* (*Rygdium*) *angolensis* Radoszkowsky

I refer to this species 2 males and 1 female from the Lower Congo; the female agrees fairly well with the very short original description.

♀.—Head: Fig. 118. Clypeus nearly as broad as high; its apex deeply, arcuately emarginate, with two strong, but short longitudinal carinæ ending in its apical edges. Front only feebly raised between the insertion of the antennæ. Vertex broad; with a small median, bare fovea; margined behind. Temples broad; margined by a very sharp carina. Mandibles about as long as the great ocular diameter; with four blunt teeth in front of their slightly curved apex. Antennæ elongate;



Figs. 118–121. *Odynerus angolensis* Radoszkowsky.

Fig. 118. Head in front, ♀. Fig. 119. Antenna, ♂. Fig. 120. Venation of front wing, ♀. Fig. 121. Head in front, ♂.

strong; slightly swollen towards their apex; their third joint long, more than one and one-half times as long as the fourth. Posterior ocelli slightly nearer to each other than to the inner margin of the eyes.

Thorax distinctly longer than broad or high. Anterior margin of the pronotum truncate; with a narrow, raised carina; its lateral angles rounded, only the carina projecting as a minute spine. Mesonotum without parapsidal furrows. Scutellum

broad; flat; with a median longitudinal, slightly raised, smooth line. Postscutellum convex; pillow-like; with a curved feeble, transverse, decolorate carina, which is somewhat emarginate on its middle; the whole of the postscutellum being depressed into a median saddle, so as to be divided into two, broadly rounded elevations; there are, however, no tubercles, teeth, or projecting edges. Propodeum short; with a shallow median concavity; its sides broadly rounded; without raised ridges or projecting lateral angles.

Legs normal; the hind coxæ with a sharp tooth on their upper face; the claws deeply bifid before their apex. Wing venation (Fig. 120) of the ordinary *Odynerus* type.

Abdomen rather short and heavy; its first tergite elongate, convexly rounded towards its base; its terminal part with a faint median depressed line. Second segment broad, wider than long; its tergite normal; its sternite very strongly depressed on its middle towards its base; the sides of this depression broadly rounded, not at all carinate.

Punctuation moderately strong; very scattered and superficial on the mesonotum, much coarser and denser on the pronotum, mesopleura, and dorsal areas of the propodeum. The punctures are very scarce, hardly visible on the clypeus, the major part of the head, the tegulæ, and the abdomen. These parts may be called impunctate; however, they are not smooth, but dull, the integument being microscopically shagreened and covered with a bloom.

Dark ferruginous-red, with indefinite black spots on front, vertex, upper side of the flagellum, apex and inner margin of the mandibles, and base of first and second abdominal segments. Mesonotum nearly entirely black. The following markings are whitish-yellow: a narrow stripe along the posterior margin of the pronotum; the outer margins of the tegulæ; a narrow, transverse, median band on the postscutellum; the apical margins of tergites 1 to 3 and of the second sternite; these margins are widened on the sides of the tergites 1 and 2 and incompletely connected with a lateral spot of the same color on each side of these segments. Wings, for the larger part, with a bright yellowish tinge; more smoky and purplish towards the apex.

Length (h. + th. + t. 1 + 2), 12 mm.

♂.—Very similar to the female. The clypeus (Fig. 121) is much broader than long, broadly and deeply, semicircularly emarginate at its apex, nearly flat. Vertex without fovea. The antennæ are elongate (Fig. 119); all the joints of their flagellum being distinctly longer than broad; their terminal joints show a tendency to curl up, but they cannot be described as forming a regular spiral as in *Odynerus*, *sensu stricto*. Their terminal hook-like joint is very long, strongly curved, narrow, digitiform, terminating in a rather sharp apex which reaches the base of the tenth joint; none of the preceding joints are flattened or grooved at the under side. Legs normal, as in the female. Clypeus impunctate; dull; without pubescence.

The ferruginous and black colors have about the same distribution as in the female, but the yellow markings are different; the yellow covers the whole of the clypeus, a broad transverse spot on the front, a narrow apical band on tergite 1, and two transverse apical spots on tergite 2. In one of the specimens there is a minute, lateral spot on the anterior part of tergite 2, which is absent in the other male. No yellow markings on the thorax.

Length (h. + th. + t. 1 + 2), 10 to 12 mm.

Belgian Congo.—1 ♀ and 1 ♂ from Matadi, June 1915, and 1 ♂ from Boma, June 1915 (J. Bequaert Coll.).

40. *Odynerus (Rygdium) picturatus*, new species

♂.—Head: Fig. 123. Clypeus very broad, nearly one and one-half times as broad as long; very moderately swollen, rather flattened in its inferior part; its apex wide, nearly one-third of the total width of the clypeus, truncate, very feebly emarginate, with bluntly rounded angles. Front flattened; with a short raised carina above the clypeus. Vertex very broad and long, without foveae; the posterior ocelli nearly as far from each other as from the inner margin of the eyes, much more remote from the hind margin of the vertex (this last distance about one and one-half times that separating the posterior ocelli from the eyes). Temples very broad and distinctly swollen behind the eyes. Temples and vertex margined behind by a distinctly raised carina. Mandibles as long as the great ocular diameter; their apex narrow and slightly curved; their inner margin with a single distinct tooth before their apex. Antennæ (Fig. 122) elongate; their scape comparatively short; their flagellum rather long, showing a tendency to curl up at its end, all its joints distinctly longer than broad; terminal hook-like joint moderately long, slender, digitiform, strongly curved,

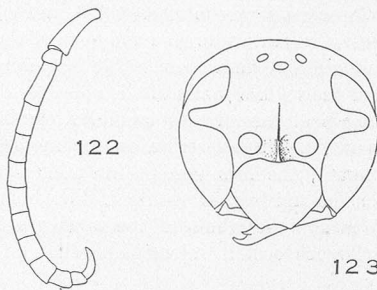
Figs. 122-123. *Odynerus picturatus*, new species.

Fig. 122. Antenna, ♂. Fig. 123. Head in front, ♂.

tapering to a sharp apex which does not reach over the base of the tenth joint and is apparently never folded against the under side of the flagellum. None of the apical joints of the flagellum show any depression or groove beneath.

Thorax rather broad, only slightly longer than broad or high. Pronotum broadly truncate anteriorly; with a fine, decolorate, raised margin; its lateral angles rounded, not projecting. Mesonotum without parapsidal grooves; with a minute, depressed line on the middle of its anterior half and on each side above the tegulæ. Scutellum flat; scarcely depressed on its middle line; without lateral tubercles or carinæ. Postscutellum transverse; short; swollen to form a transverse, crenulate ridge, which is slightly depressed into a saddle on its middle line. Propodeum comparatively long; its lateral parts distinctly swollen, reaching each other on the middle line beneath the postscutellum, not forming there, however, a dorsal posterior area, since the posterior half of the postscutellum is part of the concavity of the propodeum. Ridges of the propodeum rounded; without carinæ; its lateral angles, however, forming distinct, but bluntly rounded protuberances. Epinemia of the front legs bordered behind by a minute, raised, vertical carina of the mesopleura. Legs nor-

mal; the hind coxæ with a feeble tooth on their upper face; claws deeply bifid before their apex. Wing venation of the ordinary *Odynerus* type.

Abdomen short and heavily built; its first tergite large, broadly rounded towards its base. Second segment much broader than long; its sternite moderately, although distinctly, depressed or flattened towards its base, scarcely forming a saddle; apical margin of tergites 2 and 3 narrowly decolorate, lamelliform; the apical lamella of the second tergite slightly raised.

Punctuation coarsely rugose on head and thorax, including the dorsal areas of the propodeum; the lateral areas of the propodeum minutely striate. Clypeus and front nearly impunctate, dull. Tegulæ very minutely, microscopically punctate. Abdomen apparently impunctate; its second segment with a few, scattered punctures on its sides and near the posterior margin of its tergite; its sternite distinctly punctate.

Black, with abundant yellow markings as follows: the clypeus entirely; the outer face of the mandibles; a very broad triangle with rounded edges on the front; a narrow stripe in the emargination of the eyes continuing below towards the clypeus; a very large spot on the upper two-thirds of the temples; the under side of the antennal scape; the major part of pronotum, scutellum, postscutellum, and propodeum; a spot on the episterna of the mesopleura; large lateral spots on the tergites 1 and 2 and on sternite 2; apical bands on tergites 2, 3, and 4; the outer side of all the tibiæ and of the front femora; and spots near the apex of the middle femora and on the outer side of the middle and hind coxæ. The antennæ (except for a blackish tint on the upper side of the middle joints of their flagellum), a spot in the inferior part of the temples, the apical part of the mandibles, the humeral calli of the pronotum, tegulæ, posttegulæ, a vertical stripe on the mesopleura, the sides of the propodeum, the metapleura, the legs (except for their yellow markings and the black trochanters), the sides and base of tergite 1, the whole of sternite 1, the basal half of sternite 2, and nearly the whole of the segments 5 to 6, ferruginous-red. Wings hyaline, with yellowish costal and median cells and stigma; the radial cell with a dark, purplish spot.

In the other male specimen there are no yellow spots on the mesopleura and on the sides of the second sternite; and the fourth tergite has no apical yellow band.

Length (h. + th. + t. 1 + 2), 9.5 mm.

♀ unknown.

Belgian Congo.—Description based on 2 males from Thysville, June 1915 (J. Bequaert Coll.).

This wasp is closely related to the male of the species described in this paper as *O. angolensis* Radoszkowsky, both having similarly built antennæ. However, the difference in the shape of the clypeus, besides the punctuation of the mesonotum, separates them at once.

41. *Odynerus* (*Rygchium*) *æstuans* (Saussure)

Rhynchium æstuans H. de Saussure, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 206; *nec Odynerus æstuans* H. de Saussure, idem., p. 222.

Although this species apparently has a wide distribution, being known

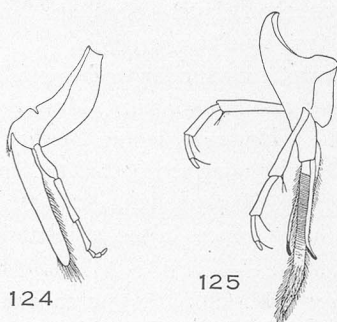
Figs. 124-125. Mouth parts of *Odynerus æstuans* (Saussure), ♀.

Fig. 124. Maxilla and maxillary palpus. Fig. 125. Labium and labial palpi.

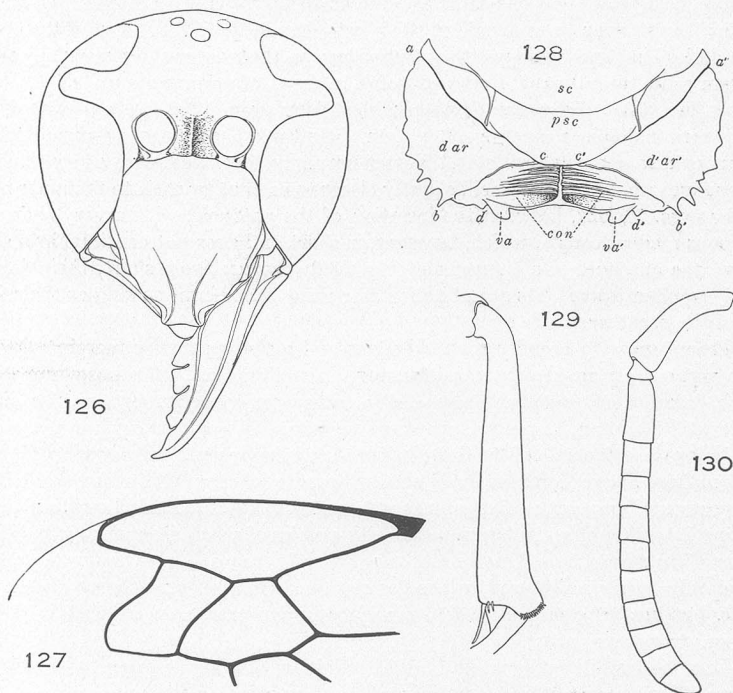
Figs. 126-130. *Odynerus æstuans* (Saussure).

Fig. 126. Head in front, ♀. Fig. 127. Venation of front wing, ♀. Fig. 128. Propodeum and postscutellum from above, ♀: *sc*, scutellum; *psc*, postscutellum; the sclerite behind the line *acc'a'* is the propodeum; *con*, concavity; *dar* and *d'ar'*, dorsal lateral areas or dorsal areas; *va* and *va'*, scales of the valvula protecting the articulating muscle of the abdomen; *ab* and *a'b'*, lateral ridges; *cb* and *c'b'*, superior ridges; *bd* and *b'd'*, inferior ridges; *b* and *b'*, lateral angles of propodeum. Fig. 129. Hind tibia, ♀. Fig. 130. Antenna, ♀.

from Senegal, Cameroon, the Belgian Congo, and Natal, very little has been published to show its true specific characters.

It is a large-sized wasp, very similar to *Synagris æstuans* (Fabricius) not only in its coloration but also in its facies. More than any other *Odynerus*, it resembles a *Synagris*. However, it can be distinguished at once from *S. æstuans* (Fabricius) by its unarmed postscutellum, the absence of strong tooth-like lateral angles on the propodeum, and the differently shaped clypeus, besides the generic differences in the labial and maxillary palpi.

♀.—Head subcircular (Fig. 126). Clypeus only slightly longer than broad; moderately convex; its inferior lateral margins, between the base of the mandibles and its apex, strongly sinuate; the basal half of this lateral margin is flattened and somewhat curved upward. The apex of the clypeus forms a distinctly projecting, median piece, which has broadly rounded lateral angles and is very faintly emarginate in the middle of its anterior margin; this apical median piece is comparatively narrow, being less than one-third as wide as the clypeus. An inconspicuous, longitudinal carina runs on each side of the middle line in the apical third of the clypeus. Mandibles long and broad; with strong ridges on their outer side; their apical inner margin with three broad, flattened teeth in front of their recurved apex. Labial palpi (Fig. 125) distinctly 4-jointed; maxillary palpi (Fig. 124) 6-jointed, their three terminal joints much smaller than their three basal ones, subequal, together about as long as their third joint. Vertex normally developed, with a broad and deep hairy fovea; the posterior ocelli slightly closer to each other than to the inner margin of the eyes. Front, between the insertion of the antennæ, with a very sharp, conspicuous median carina, which, however, is short and does not continue into a ridge above the antennal pits. Antennæ (Fig. 130) comparatively short, their flagellum feebly swollen towards its apical half; their third joint about as long as their fourth and fifth together.

Pronotum with broadly rounded edges and a sharp anterior margin. Mesonotum without carinæ or parapsidal furrows. Scutellum flat. Postscutellum without teeth, lamellæ, or protuberances; feebly transversely swollen between its anterior horizontal face and its posterior vertical portion. Mesopleura with a sharp carina bordering the epicnemial of the front legs in their inferior part. Propodeum (Fig. 128) as seen from above, comparatively short; broadly interrupted on its middle line by the postscutellum; with sharply marked lateral, superior, and inferior ridges and projecting, lateral angles; its lateral ridge with a series of sharp, irregular teeth. Dorsal areas of the propodeum densely and very coarsely, rugosely reticulate; their lateral areas only feebly sculptured, without striation. Concavity of the propodeum distinct, but not very pronounced; its surface impunctate, shining, with moderately strong, transverse striæ.

Legs long and heavily built. Middle tibiæ with a single apical spur. Femora normal; hind coxæ without a prominent tooth or ridge on their upper face. Posterior tibiæ (Fig. 129) strongly broadened at their apex, which presents at its upper external end a compact row of 12 to 15 stout and short spines; their outer side is rather abundantly hairy so that the short spines, which are scattered along the external border, are difficult to see. Wing venation: Fig. 127. The second cubital cell large.

Abdomen rather elongate. Its first segment convexly rounded at its base, distinctly narrower than the second, only slightly broader than long; the second segment about as long as broad. Second sternite with a distinct, but shallow, median depression margined by convexly rounded, elongate ridges and occupying the larger part of the sternite.

Punctuation of head and thorax medium-sized and very dense; that of the clypeus much coarser, somewhat obliquely rugose; the punctures on the back of the abdominal tergites of about the same size as on the thorax, but much more remote; much stronger on the sternites. The dorsal face of the abdomen is dull, being densely clothed with a black bloom; the ventral face smooth and shining.

The coloration of the four specimens before me is very similar. Mostly black; with the antennæ, clypeus, larger part of the mandibles, legs, larger part of pronotum, tegulæ, mesopleura, sternum, propodeum, and base and sides of first tergite bright ferruginous-red. Rounded ivory-white spots as follows: one on the front, at the upper end of its median carina; one on each side of the pronotum; one on the tegulæ; a transverse one on the postscutellum; and a pair on the first and second tergite. The pair of the first tergite is rather close together, the spots being as far from the lateral margins of the tergite as from each other and distinctly removed from its apical margin; the spots of the second tergite are very close to the apical margin and larger than on the first tergite. Wings uniformly infuscated, with a yellowish-golden tinge.

Length (h. + th. + t. 1 + 2), 16 to 18 mm.

The ♂ has apparently not been described.

Belgian Congo.—Stanleyville, 2 ♀ ♀, April 1915; Niangara, 1 ♀, November 1910; Medje, 1 ♀, July 1910 (Lang and Chapin Coll.).

42. *Odynerus* (*Rygchium*) *osborni*, new species

Plate I, Figure 4

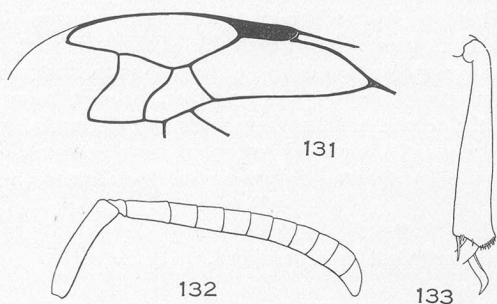
♀.—Head subcircular. Clypeus slightly longer than broad; moderately convex; shaped almost exactly as in *O. æstuans* (Saussure), (= *Rygchium æstuans* Saussure), especially with regard to its apex, terminal side-margins, and sculpture. Mandibles as in *O. æstuans* (Saussure); with three broad, flattened teeth before their apex. Labial and maxillary palpi also as in that species. Vertex with a small hairy fovea; the posterior ocelli as far from each other as from the inner margin of the eyes. Front with a sharp carina between the insertion of the antennæ. Antennæ (Fig. 132) slightly shorter than in *O. æstuans*; their flagellum somewhat more swollen; their third joint distinctly shorter than the two following together.

Thorax almost exactly as in *O. æstuans*. The propodeum also similarly shaped; its dorsal areas more finely rugulose; its superior ridges very strong, raised so as to form lamellæ; the teeth less distinct along its lateral ridges, but stronger along its inferior ridges; the transverse striæ of its concavity much stronger. The lateral areas of the propodeum are distinctly sculptured, presenting a fine transverse striation. Transverse ridge of the postscutellum much more distinct than in *O. æstuans*.

Legs comparatively short. Middle tibiae with a single apical spur. Femora normal. Hind coxae without tooth or ridge on their upper face. The posterior tibiae (Fig. 133) are moderately broadened at their apex, which presents on its upper external end a rather loose comb of 9 slender spines; their outer side is only slightly pilose, so that the few, short spines along the external border are very apparent. Wing venation: Fig. 131. The second cubital cell comparatively small.

Abdomen rather short and compact. First segment much broader than long, only slightly narrower than the second segment, which is about twice as broad as long. Second sternite only slightly flattened on its middle; without depression.

Punctuation as in *O. aestuans*, but denser on the dorsal face of the abdomen, which has no black bloom; the punctures, therefore, more apparent.



Figs. 131-133. *Odynerus osborni*, new species.

Fig. 131. Venation of front wing, ♀. Fig. 132. Antenna, ♀. Fig. 133. Hind tibia, ♀.

Coloration very striking. Mostly black; scape, under side of flagellum, clypeus, apex of mandibles, pronotum almost entirely, tegulae, mesopleura for the most part, and legs, ferruginous-red. A small whitish dot on the front at the upper end of the interantennal carina and on the posttegulae. Dorsal areas of propodeum and sides of the five anterior abdominal tergites, each with an almost circular, ivory-white spot; these spots are situated far from the apical margins and form a lateral, very regular row; they are the largest on the sides of the second tergite and become smaller behind. Wings uniformly infuscated, with a purplish effulgence.

Length (h. + th. + t. 1 + 2), 13 mm.

♂ unknown.

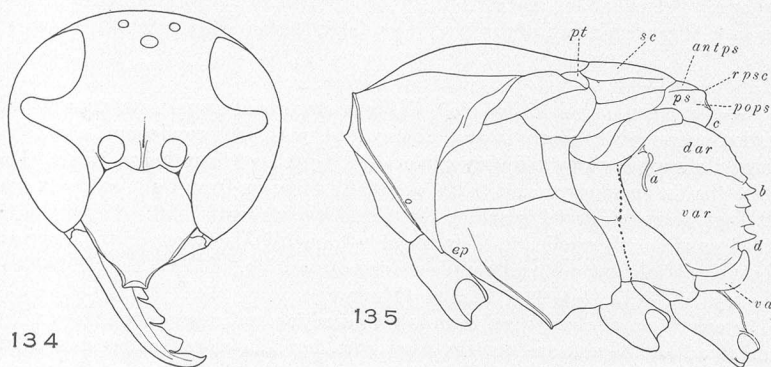
Belgian Congo.—Walikale, 1 ♀, January 1915 (J. Bequaert Coll.).

This species is closely related to *O. aestuans* (Saussure) but, I believe, quite distinct. The absence of a median depression on the second sternite, the different sculpture of the propodeum, and the different armature of the apex of the hind tibiae (in addition to the striking coloration, which may, however, be variable) are sufficient to separate it.

43. *Odynerus* (*Rygchium*) *marginellus* (Fabricius)

This species is perhaps the most common wasp of equatorial Africa; the markings of the body are very striking, at least in its typical form; but they are misleading, for several other species exhibit exactly the same coloration. Such species are *Odynerus lateralis* Fabricius (= *Rygchium furax* Kohl); *O. pseudolateralis* Meade Waldo; *O. gestroi* (Magretti), of which *Odynerus spiniger* A. v. Schulthess is probably a synonym; and others. It therefore seems worth while to record its most important structural characters.

♀.—Head: Fig. 134. Clypeus distinctly longer than broad; piriform; distinctly swollen; strongly narrowed towards its anterior margin, which has about one-quarter of the total width of the clypeus and is straight or very slightly incurved;



Figs. 134-135. *Odynerus marginellus* (Fabricius).

Fig. 134. Head in front, ♀. Fig. 135. Thorax in profile, ♀: *sc*, scutellum; *ps*, postscutellum; *antps*, its anterior or horizontal face; *pops*, its posterior or vertical face; *rpsc*, its transverse ridge; *ab*, lateral ridge of propodeum; *bc*, its superior ridge; *bd*, its inferior ridge; *va*, valvula protecting the articulating muscle of the abdomen; *dar*, dorsal lateral area or dorsal area of propodeum; *var*, ventral lateral area or ventral area of propodeum; *pt*, posttegula; *ep*, epicnemium (prepectus or epicnemial area).

it seems, however, to be deeply emarginate, owing to the presence of two strong lateral carinae, which run obliquely in the inferior part of the clypeus from near its median line towards the prominent lateral angles of its anterior margin. Surface of the clypeus with a few scattered, strong punctures, but not rugose as a whole. Vertex with a crescent-shaped, median, groove-like, hairy depression near its posterior margin. The maxillary palpi much as in *O. æstuans* (Saussure). Mandibles slightly longer than the great ocular diameter. Antennæ scarcely swollen towards their apex; their third joint about three times as long as the second; the following joints as long as, or slightly longer than, broad.

Thorax (Fig. 135) densely covered with medium-sized punctures, except on the

posterior half of the mesonotum, the scutellum, and the tegulae, which are smooth and shining, with a few remote, very superficial punctures towards their sides. Mesonotum without parapsidal furrows, but with a fine depressed longitudinal line on each side above the tegulae. Scutellum abruptly oblique on its sides near the wings. Postscutellum with its anterior half depressed, slightly oblique, short, terminating on each side in a blunt tubercle, broadly rounded towards its vertical posterior portion, without rough sculpture or denticulations. Mesopleura with a strong and sharp carina in front, bordering the epicnemial of the anterior legs. This carina begins on the lower half of the pleura near the termination of the episternal suture and runs somewhat sinuately towards the mesosternum, where it continues to near the median ventral line as a very strong, transverse ridge in front of the insertion of the legs. Concavity of the propodeum strongly, transversely striate; its superior ridge rounded; the striation continuing in the dorsal areas, which are very rugose. The lateral and inferior ridges of the propodeum sharp, with a number of sharp teeth; its ventral lateral areas not striate, with remote, heavy punctures.

Abdomen uniformly and strongly punctured all over, more densely so towards the hind margin of the second and following tergites; very shining between the punctures. Second abdominal sternite uniformly flattened, slightly convex; rounded at its base towards a short, abruptly vertical face; without any tubercles or excavation.

Length (h. + th. + t. 1 + 2), 12.5 to 15 mm.

♂.—Very similar to the female. Clypeus more pentagonal; its apex slightly emarginate and with sharp lateral angles, but without prominent longitudinal carinae; its surface very minutely punctate. Vertex without hairy fovea. Last joint of the antennae short and thick, gradually tapering from its base to its very blunt apex, scarcely curved, reaching the base of the eleventh joint. Femora of the middle legs distinctly swollen in their apical half, slightly depressed on the inner side in their basal half, but without saddle-shaped excavation.

Length (h. + th. + t. 1 + 2), 9 to 14 mm.

The coloration of the typical form is very striking and nearly the same in both sexes: Head and thorax are, for the most part, ferruginous-red, sometimes nearly completely so; as a rule, however, the front and vertex, the sutures of the thorax, the mesonotum, and the scutellum are partly or completely black; legs ferruginous-red. Abdomen black; ferruginous at its base and often more or less so on its ventral side and at its anal segment; with a broad, continuous, bright yellow lateral band running from the middle of the first tergite to the anal segment, the yellow color reaching the hind margin of the first tergite. In the male, the clypeus, a frontal spot between the antennae, and the inferior margin of the emargination of the eyes are also yellow, although the sides of the clypeus retain sometimes the ferruginous color. The wings are dark purplish-brown in their apical half, hyaline with a slight yellow tinge in their basal half.

Belgian Congo.—One of the common species. I have seen numerous specimens from Banana, Malela, Boma, Thysville, Stanleyville, Garamba, and Faradje.

This species has a wide range on the African continent, being recorded from Mauritania and Somaliland to the Transvaal.

In the Congo Expedition collection there is a single male from Boma

which presents all the structural characters of *O. marginellus*, but in which the yellow markings are nearly completely gone. The abdomen has no lateral fasciæ, but one sees a few punctiform yellow spots on the sides of the different tergites, these markings being much larger on the two apical segments; on the head, the yellow is restricted to two longitudinal stripes on the clypeus. There can, however, be no doubt that this is an aberrant specimen of *O. marginellus* (Fabricius).

O. marginellus (Fabricius) is the most common representative in Central Africa of a group of medium-sized, variously colored species of *Odynerus* with a smooth, shining scutellum and posterior half of the mesonotum; in their other structural characters, these wasps all agree fairly well with the description given above for *O. marginellus*. This group includes numerous forms distributed from Southern Europe throughout the African Continent and the Indo-oriental region as far as Formosa and Australia. The first described form is *O. hæmorrhoidalis* (Fabricius), and the following forms, which I believe to belong in this group, are hardly more than color variations of *O. hæmorrhoidalis*.

1. *O. hæmorrhoidalis* (Fabricius) and its numerous color varieties: *quinquecinctus* (Fabricius), *ater* (Saussure), *carnaticus* (Fabricius), *medius* (Maindron), *künckeli* (Maindron), *parentissimus* (Saussure), *rubropictus* (Saussure), *sanguineus* (Saussure), *dohertyi* (Schulz), *salomonis* (G. Meade Waldo), and others. Distributed from Southern Arabia, throughout the Indo-oriental region, to Australia and the Solomon Islands.¹

2. *O. oculatus* (Fabricius) is the common form of Southern Europe, Egypt, and Southern Arabia, with the var. *lefebvrei* (Lepeletier). Magretti described a var. *somalicus* from Abyssinia.

3. *O. marginellus* (Fabricius). See the description given above.

4. *O. cyanopterus* (Saussure), with its varieties *sabulosus* (Saussure) and *congicus* J. Bequaert, has nearly the same distribution as *O. marginellus* (Fabricius) and is found also in Southern Arabia (p. 146).

5. *O. multispinosus* (Saussure). Natal.

6. *O. xanthurus* (Saussure). Cape Colony.

7. *O. mirabilis* (Saussure) and its color forms: *O. superbus* (Saussure), *O. decoratus* (Saussure), and *O. rothi* (W. Kirby). Malay Archipelago, New Guinea, Australia, Tasmania.²

Ethology. Notwithstanding the abundance of *O. marginellus*, E. Roubaud³ is the only observer who has paid any attention to its life history. According to his observations, which were made in the Dahomey, this

¹ W. A. Schulz, Berlin. ent. Zeitschr., XLIX, 1905, pp. 220-223.

² W. A. Schulz, Berlin. ent. Zeitschr., XLIX, 1905, pp. 218-220.

³ Ann. Sc. nat. Zool., (10), I, fasc. 1, 1916, pp. 32-35 (*Rhynchium marginellum*).

species shows a marked preference for native huts. It burrows galleries indifferently in the wood of the poles which support the roof or in the mud of the walls; the entrance to the nest is free and each gallery contains two or three cells in succession, separated by mud partitions. If a female burrows several galleries, they are not connected with each other. The egg is fixed by a thread in the bottom of the cell; then the prey, consisting of paralyzed caterpillars, is hastily brought in, the entrance to the cell being closed before the egg hatches.

Odynerus (Rygchium) cyanopterus (Saussure)

The structural characters of this species are much the same as those of *O. marginellus* (Fabricius). Its most striking peculiarity is the presence of an abundant, short pubescence, which is deep black or brownish-gray on vertex, pronotum, and mesonotum; grayish or silvery-white and somewhat pruinose on the rest of the body. This silky bloom is especially noticeable on the abdomen and is in strong contrast with the nearly naked body of *O. marginellus*.

O. cyanopterus never possesses lateral yellow bands on the abdomen; but the clypeus and front of the male have yellow markings similar to those of *O. marginellus* (Fabricius), whereas the wings are also colored as in that species.

The following variations of the color of the body are noteworthy:

1. Typical *O. cyanopterus* (Saussure).— Body almost equally black and ferruginous-red; the latter color extending over the head, thorax, legs, and first abdominal segment, sometimes also over the second segment. I have not yet seen this typical form, which seems to occur chiefly in the Sudan, Northeastern Africa, and Southern Arabia.

2. var. *sabulosus* (Saussure).— The ferruginous-red color much less extended, the black covering the whole of the abdomen, the front, and the larger part of the mesothorax (the mesonotum and scutellum almost entirely black). The anal segment partly ferruginous. This seems to be the common South African form; I have seen females and males from Lourenço Marques (Cornell University Coll.). The var. *mossambicus* Gribodo and *Rhynchium transvaalense* P. Cameron are, in my opinion, not different from this var. *sabulosus*.

3. var. *congicus*, new variety.

44. Odynerus cyanopterus var. congicus, new variety

♀.— Body almost entirely black. Only the following parts are more or less ferruginous-brown: the apical portion and sometimes also the sides of the clypeus; the mandibles; the emargination of the eyes; a line on the posterior orbits; the

under side of the antennæ; the tegulæ; the apex of the front femora; the tibiæ and tarsi of the front legs; and the end joint, with the claws, of all the legs. The wings are as in the typical form: hyaline at their base, dark brown with purple effulgence on their apical two-thirds.

Length (h. + th. + t. 1 + 2), 12.5 to 15 mm.

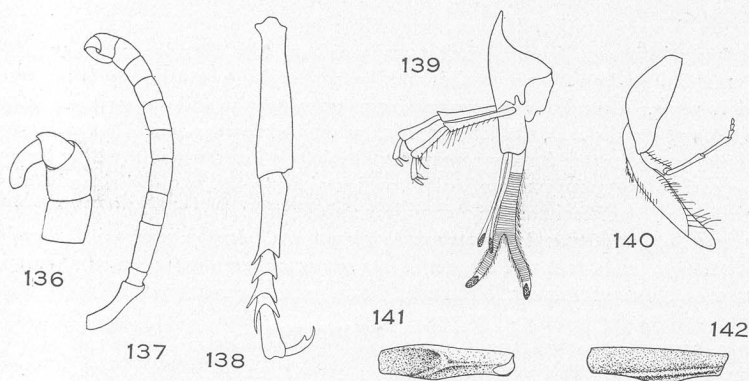
Belgian Congo.—Avakubi, 1 ♀, holotype; Stanleyville, 5 ♀ ♀, paratypes (Lang and Chapin Coll.).

This seems to be the only form of the species hitherto recorded from the Congo.

45. *Odynerus* (*Rygchium*) *synagroides* (Saussure)

(= *Synagris odontophora* Schletterer; *Rygchium synagroides* Saussure)

A. Schletterer¹ described from the Belgian Congo a *Synagris odontophora*, which Kohl later on transferred to the genus *Rygchium*.² There are in the collection of the Congo Expedition numerous specimens of a wasp agree-



Figs. 136-142. *Odynerus synagroides* (Saussure).

Fig. 136. Terminal joints of antenna, ♂. Fig. 137. Antenna, ♂. Fig. 138. Front tarsus, ♀. Fig. 139. Labium and labial palpi, ♀. Fig. 140. Maxilla and maxillary palpus, ♀. Fig. 141. Middle femur, ♂, from beneath. Fig. 142. Middle femur, ♂, in front.

ing in all details with Schletterer's excellent description. This insect belongs with the *Synagris*-like species of *Odynerus* and, since Schletterer includes it in *Synagris*, he compares it with other species of that genus. However, among *Odynerus* too, there are several forms closely related to it;

¹ Ann. Soc. ent. Belgique, XXXV, 1891, p. 21.

² Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 250.

and, since the species is apparently very common, one might expect to find that it was known long ago under another name. After a careful examination of the subject I came to the conclusion that *Synagris odontophora* Schletterer is identical with *Ryghium synagroides* Saussure (= *sichelii* Saussure).¹

The following description is made on specimens from the Belgian Congo:

♀.—Clypeus piriform; scarcely longer than broad; convexly swollen; strongly tapering towards its apical margin, which is very narrow, distinctly emarginate, and presents on each side a strongly carinate, prominent angle; its surface slightly rugose by the presence of numerous, scattered, strong and oblique punctures. Vertex with a small, median, hairy depression. The head very long behind the eyes; the distance between the lateral ocelli and hind margin of the vertex being about three times that separating the ocelli from the eyes; the lateral ocelli about as far from each other as from the eyes. The three terminal joints of the maxillary palpi very short and subequal (Fig. 140); the labial palpi (Fig. 139) distinctly 4-jointed. Mandibles about as long as the great ocular diameter, or even longer; their inner margin with three deep but narrow notches, forming broad, blunt teeth. Flagellum of the antennæ scarcely swollen towards its apex; the third antennal joint about four times as long as the second; the following joint distinctly longer than broad.

Thorax densely, uniformly, very rugosely punctate all over, nearly reticulate. Mesonotum without longitudinal carinæ; with a short, fine, depressed, median line in its anterior half and another very short one on each side, above the tegulæ; no parapsidal furrows. Scutellum moderately convex; strongly and rugosely punctate, with a more or less distinct, median, fine furrow, which becomes somewhat carina-like in its anterior half; this furrow sometimes obsolete. Postscutellum without sharp teeth or carinæ; very rugosely reticulate, which gives to the rounded ridge between its horizontal and vertical portion a crenulate appearance; this ridge often depressed on its middle, producing two transverse elevations. Propodeum with rounded superior ridges; its lateral and inferior ridges sharp and crenulate; its lateral angles with two or three prominent, often digitiform, teeth; ventral lateral areas finely punctate with a few scattered stronger punctures; dorsal lateral areas rugosely punctate, somewhat reticulate. Concavity of the propodeum finely and densely, transversely striate. The mesopleura with a strong carina in front bordering the epinemia of the anterior legs, much as in *O. marginellus*; this carina forming on the mesosternum a feeble ridge in front of the insertion of the middle legs.

Anterior tarsi (Fig. 138) slender; hind tibiæ with numerous minute spines along their upper margin, their external apex with a loose comb of 6 to 12 spines.

Abdomen covered with medium-sized punctures, which become stronger and denser towards the hind margin of the tergites; its integument dull on the back, scarcely shining on the ventral side. Second sternite convexly rounded towards its base in profile; flattened or slightly depressed on its middle; without lateral tubercles or median saddle-like groove.

¹ To prevent confusion, it may be well to point out that the insect described here as *Odynerus synagroides* (Saussure) is *Ryghium synagroides* Saussure (= *sichelii* Saussure), whereas H. de Saussure's *Odynerus synagroides* must be known as *Odynerus ventralis* Saussure (p. 150; compare also the bibliographic list of the species in the second part of this paper).

Black; clypeus partly or entirely, front, cheeks, mandibles, antennæ, legs, and sometimes also the sides of the first tergite, more or less tinged with ferruginous; the three apical abdominal segments bright chrome-orange; the base of the fourth segment black, especially on its ventral side. Wings uniformly black-brown, with strong purple effulgence. The body with a black, very short and appressed pubescence except on the terminal, orange-colored segments, which are densely clothed with short, appressed, bright golden-yellow hairs. This coloration seems to be very constant, although it is found in several other species of *Odynerus* and *Synagris* (see the list of group II, p. 125).

Length (h. + th. + t. 1 + 2), 15 to 19 mm.

♂.—Clypeus shorter than in the female; subcircular; with scattered fine punctures, and, between these, very minutely rugose; its apical margin broader than in the female, deeply, semicircularly emarginate, with projecting, lateral, tooth-like angles but without carinæ. Vertex without hairy fovea. Last joint of the antennæ (Figs. 136 and 137) short and thick; cylindrical; nearly equally broad over its whole length; slightly curved on its middle; not tapering towards its apex, which is broadly rounded and depasses distinctly the apex of the eleventh joint. None of the terminal joints of the antennæ excavated beneath. Mandibles with a very deep, subcircular emargination about the middle of their inner margin. Femora of the middle legs (Figs. 141 and 142) scarcely swollen, with somewhat angulate sides, flattened or very obsoletely depressed in their basal third on the inner side.

Coloration as in the female; the four apical segments of the abdomen chrome-orange.

Length (h. + th. + t. 1 + 2), 9 to 15 mm.

Belgian Congo.—One of the most common wasps of that region; the collection includes numerous females and males from Banana, Malela, Boma, Coquilhatville, Basoko, Stanleyville, Bafwasende, Bafwaboli, Gaman-gui, Avakubi, Medje, Poko, Garamba, Faradje, Vankereckhovenville, Yakuluku, Lubutu, Walikale, and Kasindi.

Drawings of the head, as seen in front, of the female and the male of *O. synagroides* (Saussure) may be found in Schletterer's paper.¹ They show the characteristic shape of clypeus and mandibles. They leave no doubt that the Congo specimens described above belong to Schletterer's "*Synagris odontophora*." H. de Saussure has also figured the clypeus of female and male of his *Rygchium synagroides*.² Both of these authors evidently describe the same wasp, since no related species of *Odynerus* or *Synagris* has a similarly shaped clypeus.

¹ Ann. Soc. entom. Belgique, XXXV, 1891, Pl. I, figs. 1 and 2.

² In Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, Pl. IV, figs. 13 and 14.

46. **Odynerus (Rygchium) ventralis** Saussure(= *Odynerus synagroides* H. de Saussure)

This species must not be confused with several other species of *Odynerus* having a similar coloration of the body, such as *O. synagroides* (Saussure), *O. ardens* Guérin, and, above all, *O. anceps* (Gribodo). H. de Saussure¹ has given a detailed description of it, together with excellent drawings. About the same time, A. Schletterer studied specimens of a wasp, from the Belgian Congo, which he described very completely as *Synagris tropidia* Schletterer.² However, in comparing the descriptions and figures of Saussure's *O. ardens* and Schletterer's *S. tropidia*,³ I became convinced that they refer both to the same species.

♀.—Clypeus about as broad as long, or slightly broader; piriform; distinctly swollen on its upper part; flattened towards its anterior margin, which is very wide, having about one-third of the total width of the clypeus, and broadly truncate; its lateral angles projecting and somewhat raised, though not carinate. Surface of the clypeus with scattered, medium-sized punctures, which become much stronger on its flattened anterior part so as to give it a rugosely striate appearance; its anterior margin broadly smooth, lamelliform. Vertex (Fig. 151) without hairy fovea, very strongly developed and swollen, as are also the temples behind the eyes. Posterior ocelli about as far from each other as from the inner margins of the eyes, nearly four times as far from the hind margin of the vertex. Vertex feebly margined behind; the strongly raised carina which borders the temples becoming obsolete on the upper part of the head. Maxillary palpi (Fig. 144) with their basal joint broad and long; the next two joints shorter and about of equal length; the three following much shorter, subequal; the fourth and fifth together nearly as long as the third. Labial palpi (Fig. 145) four-jointed; their three basal joints thick; the fourth small and slender. Mandibles about as long as the great ocular diameter; with a terminal, curved, strong apex and three other blunt teeth on their inner margin. Antennæ (Fig. 153) scarcely swollen towards their apex; their scape relatively long; their third joint shorter than the fourth and fifth together; joints four, five, six, and seven slightly longer than broad. Head and thorax very strongly and densely punctate, nearly rugosely reticulate.

Thorax heavily built, scarcely longer than broad. Anterior margin of the pronotum with a sharp carina, which is sublamelliform towards its sides; these forming bluntly rounded, projecting, lateral angles. Anterior face of the pronotum smooth and shining. Mesopleura with a truncate carina in front, bordering the epinemia of the anterior legs, and continuing as a sharp ridge towards the middle of the mesosternum. Mesonotum with three short and feeble, longitudinal grooves; a median

¹ In Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 161, Pl. iv, fig. 17; Pl. xvii, figs. 9 and 9c.

² Ann. Soc. ent. Belgique, XXXV, 1891, p. 20, Pl. i, figs. 3 and 5.

³ Kohl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 250, found, on examination of the types, that this species is not a *Synagris*; he includes it in *Rygchium*.

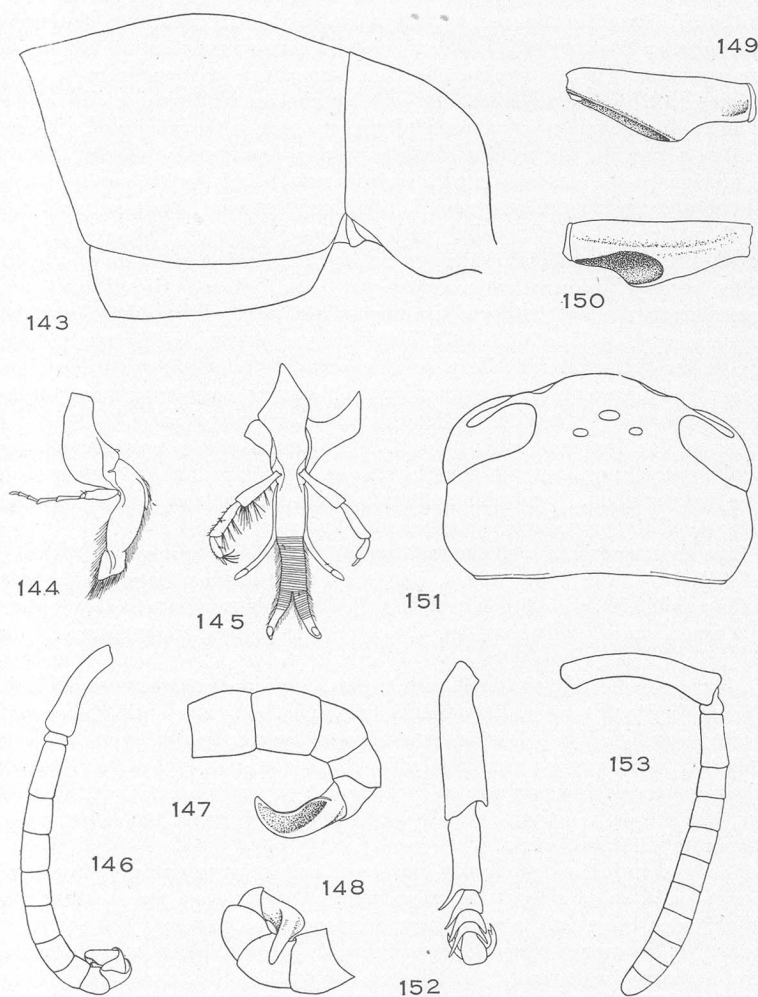
Figs. 143-153. *Odynerus ventralis* Saussure.

Fig. 143. Two basal abdominal segments in profile, ♀. Fig. 144. Maxilla and maxillary palpus, ♀. Fig. 145. Labium and labial palpi, ♀. Fig. 146. Antenna, ♂. Fig. 147. Terminal joints of antenna, ♂, from above. Fig. 148. Terminal joints of antenna, ♂, from beneath. Fig. 149. Middle femur, ♂, from behind. Fig. 150. Middle femur, ♂, in front. Fig. 151. Head from above, ♀. Fig. 152. Front tarsus, ♀. Fig. 153. Antenna, ♀.

one on the middle line in its anterior third; and two shorter lateral ones (more obsolete), each of which is situated above one of the tegulae. The posterior two-thirds of the mesonotum present, furthermore, on its middle three more or less marked, longitudinal ridges; in the most typical individuals, one sees them as figured by A. Schletterer for his *S. tropidia*¹; the two lateral carinae, however, are always much more apparent than the median one, and they converge towards the scutellum, becoming more obsolete behind. In some specimens the lateral carinae continue, still more diverging, into very superficial grooves towards the pronotum. These two lateral ridges occupy the position of the parapsidal furrows of some related species² and are apparently homologous with such furrows. The median posterior ridge is evidently the continuation of the anterior median groove of the mesonotum. Scutellum distinctly swollen; pillow-like; with a fine median longitudinal carina, which is somewhat furrowed and disappears in a groove towards the hind margin; this carina is often obsolete. Postscutellum prominent; with a short horizontal and a much longer vertical portion; its transverse ridge raised, with a lateral crenulate tubercle on each side and, on its middle, with a projecting tooth which is the termination of a more or less distinct, longitudinal, median carina. Propodeum with sharp lateral, superior, and inferior ridges; its superior ridge, however, much less apparent than the two others; on and above the moderately prominent lateral angle, there is a series of four or five irregular teeth. Dorsal lateral areas of the propodeum rugosely reticulate, widely separated from each other on the median line by the vertical face of the postscutellum. Ventral lateral areas with scattered, medium-sized punctures. Concavity of the propodeum coarsely and obliquely striate.

Legs short and heavy; their tarsi broad; this is very marked on the anterior tarsi (Fig. 152), where the second, third, and fourth joints are extended at their apex in a spiniform, anterior lobe; tibiae with a few minute spines on their outer face and a row of six to eight short, heavy, blunt spines on their external apex. Middle tibiae with a single apical spur.

Abdomen uniformly scattered with remote, medium-sized punctures, which are only slightly denser towards the posterior margin of the tergites. Second abdominal sternite in profile (Fig. 143) strongly swollen and vertically sloping at its base; its middle part with a broad and deep, saddle-like depression; the sides of its tergite slightly depressed; this produces on each side of this tergite an oblique, rather sharp ridge, which ends in a blunt tubercle near its anterior margin and slopes gradually towards its posterior margin.

The head and thorax are nearly bare; with only a very short, grayish pile which becomes longer on the sides of the propodeum. The clypeus is slightly silvery hairy. The abdomen bears only a very short, bloomy pubescence, which gives it a dull appearance; its orange-brown tip has no bright golden covering, a good distinction from *O. synagroides* (Saussure) (= *Synagris odontophora* Schletterer).

Black. The clypeus; the front partly; the temples; the antennae (darker brown on their upper side); indefinite spots on pronotum, mesopleura, scutellum, and postscutellum (these spots may disappear completely); the tegulae; and the legs more or less are ferruginous. I have seen one female in which the pleura and propodeum are mostly ferruginous-red, and even the raised carinae of the mesonotum and the basal

¹ Ann. Soc. ent. Belgique, XXXV, 1891, Pl. I, fig. 5.

² Very often, in wasps, furrows and carinae replace each other, the carina becoming grooved on its upper part.

segment of the abdomen are suffused with the same color. The two apical abdominal segments, and sometimes the apical third of the preceding, bright orange-brown. Wings uniformly dark brown, nearly black, with beautiful purple effulgence.

Length (h. + th. + t. 1 + 2), 17 to 20 mm.

♂.—Differs scarcely from the female. Clypeus more subcircular; with very remote, minute punctures and very finely rugulose all over; convex, indistinctly depressed towards its anterior margin. The vertex shorter and less swollen behind the eyes. Antennæ (Fig. 146) longer; the scape relatively shorter; joints three to nine distinctly longer than thick. None of the terminal joints excavated beneath. Apical, hook-like joint (Figs. 147 and 148) very long, gradually tapering from a broad base to its blunt apex, twisted, *i. e.* curved twice: once near its base downwards; then near its apex which is directed upwards and lies on the under face of the flagellum near the apex of the ninth antennal joint. Legs more slender than in the female; the intermediate joints of the anterior tarsi not distinctly more extended anteriorly than behind, at their apex. The middle femora have a very characteristic shape; on their anterior face, the inferior basal half possesses a very strong, saddle-like depression, bordered by a raised ridge which runs from the middle of the femora towards its apex; this ridge forms a broadly rounded, projecting angle about the middle of the inferior margin of the femur, when looked at from behind (Figs. 149 and 150). This peculiar shape of the middle femora was figured and described by F. Kohl for *Synagris tropidia* Schletterer.¹

Pubescence and coloration scarcely different from that of the female. Clypeus also ferruginous, only feebly more silvery hairy than in the female.

Length (h. + th. + t. 1 + 2), 15 to 18 mm.

Belgian Congo.—Numerous ♀♀ and ♂♂ from the following localities: Boma, Stanleyville, Avakubi, Poko, and Faradje.

Odynerus (Rygychium) forticulus (Kohl), from Southern Arabia and Egypt, is a related species; however, from the shape of the clypeus, which is yellow in the male, and the form of the terminal joints of the male antennæ, it is undoubtedly distinct. *Odynerus natalensis* Saussure has the same coloration, but no carinæ on the mesonotum. *Odynerus magretti* Gribodo also has the coloration of *O. ventralis*, but, according to the description, differs in having the clypeus arcuately emarginate at its apex; *O. magretti* ought to be compared with *O. natalensis* Saussure and *O. forticulus* (Kohl).²

The description of the female *Odynerus ventralis* (= *synagroides* Saussure) given by H. de Saussure in Grandidier³ undoubtedly applies to the wasp described here from the Congo. The same cannot be said of the description of the male, where de Saussure seems to have mixed two different species, as appears from his description of the clypeus. His drawing of the male clypeus (Pl. xvii, fig. 9c) certainly does not belong to the male of *O. ventralis* Saussure but agrees much better with that of the male of *O. forticulus*

¹ Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 251, Pl. v, figs. 22 and 29.

² W. A. Schulz, Zoolog. Ann., IV, 1911, p. 199.

³ Hist. de Madagascar, XX, pt. 1, Hym., 1890, p. 161, Pl. iv, fig. 17.

(Kohl). Good drawings of the head and clypeus in the female, and of the thorax have been published by Schletterer; the clypeus of the male and the middle femur of the same sex have been figured by F. Kohl. I have given a figure of the middle femur of the male in order to allow of a comparison with its shape in *O. anceps* (Gribodo).

Odynerus ventralis Saussure is probably widely distributed throughout the western part of the Ethiopian region, being found from Senegal to the Gaboon and the Upper Nile. It must, however, often have been confused with related species, especially with *O. anceps* (Gribodo). See that species.

47. *Odynerus* (*Rygchium*) *anceps* Gribodo

The following description is based on a pair which was taken as adults from a nest found at Lukula (see below). There can, therefore, be no doubt that they belong, as female and male, to the same species, a fact which is important since the female of this species resembles very closely that of *O. ventralis* Saussure.

♀.—Head (Fig. 155) of the general shape of that of *O. ventralis* Saussure; the vertex being also distinctly swollen above the eyes, when seen in front. Clypeus also very similar to that of *ventralis*, with broadly truncate apical margin; in the sculpture there is a slight difference between the two species: the surface is almost uniformly and finely rugose all over, whereas in *O. ventralis* there is a distinct separation into an upper, rather punctate and a lower, very rugose part. Vertex without fovea; the relative distance of the posterior ocelli from each other, from the inner margin of the eyes, and from the hind margin of the vertex, about as in *O. ventralis*; however, the vertex apparently a little shorter (Fig. 158). Palpi and mandibles as in *O. ventralis*. Third joint of the antennæ (Fig. 157) about as long as joints four and five together.

Structure of the thorax very similar to that of *O. ventralis*. The mesonotum presents also, over its posterior two-thirds, two longitudinal raised lines, but they are much less apparent than in *O. ventralis* and never carina-like; the median raised line is only feebly indicated. The scutellum, postscutellum and propodeum are also similar, but the lateral tubercles and median carina of the postscutellum are less distinct than in *O. ventralis* and the reticulation covering the postscutellum is much finer. Legs and wings as in *O. ventralis*.

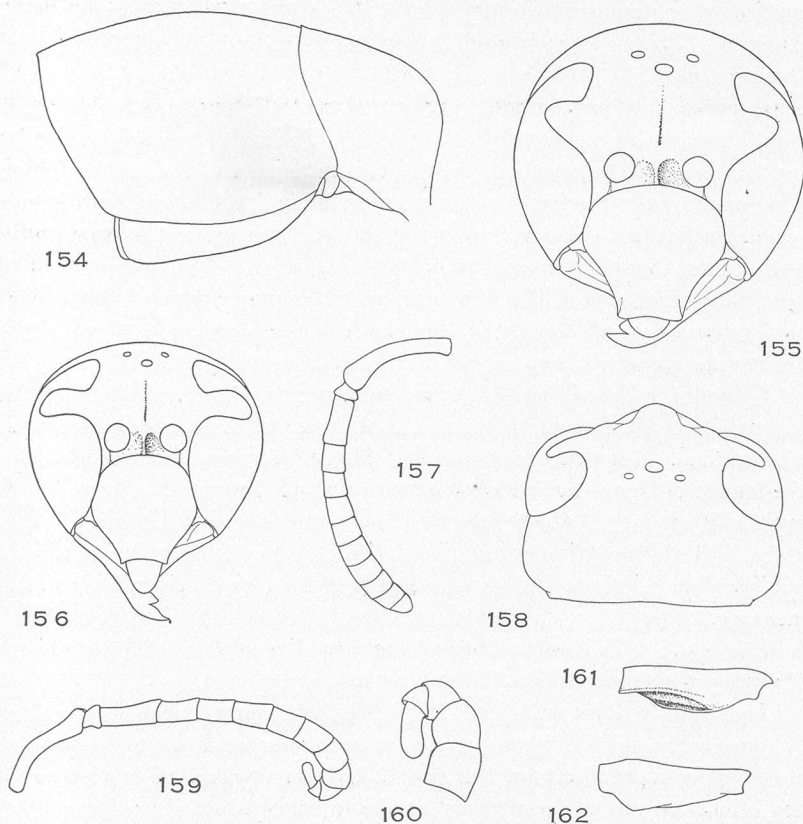
Abdomen (Fig. 154) as in *O. ventralis*, but the second sternite scarcely depressed on its middle, its lateral ridges low, broadly rounded, not forming tubercles towards their base, but, when seen in profile, very gradually sloping.

Punctuation and coloration much as in *O. ventralis*. The orange-brown tip of the abdomen has no bright golden covering of pubescence.

Length (h. + th. + t. 1 + 2), 16 mm.

♂.—Head and clypeus (Fig. 156) very similar to those of the male of *O. ventralis*; the apical margin of the clypeus being also broadly truncate. Terminal hook-like joint of the antennæ (Figs. 159 and 160) of an entirely different shape: it is comparatively short and broad, flattened, scarcely curved, not at all twisted, very broadly

rounded at its apex, and almost spatulate; it reaches over the apex of the ninth joint; none of the terminal joints of the antennæ excavated beneath. The second abdominal sternite is more depressed on its middle than in the female, distinctly saddle-like; but its lateral ridges are broadly rounded and gradually sloping towards their base, so that in profile the sternite presents about the same shape as in the



Figs. 154-162. *Odynerus anceps* (Gribodo).

Fig. 154. Two basal abdominal segments in profile, ♀. Fig. 155. Head in front, ♀. Fig. 156. Head in front, ♂. Fig. 157. Antenna, ♀. Fig. 158. Head from above, ♀. Fig. 159. Antenna, ♂. Fig. 160. Terminal joints of antenna, ♂. Fig. 161. Middle femur in front, ♂. Fig. 162. Middle femur from behind, ♂.

female. Shape of the middle femora (Figs. 161 and 162) somewhat similar to that of *O. ventralis*, but the saddle-like depression of their anterior face is more elongate and also more pronounced, being bordered by almost carina-shaped, longitudinal ridges; the projecting rounded angle on their inferior margin is distinctly nearer to the base of the femur (in *O. ventralis* it is placed about the middle).

Coloration similar to that of the female. Upper part of the clypeus somewhat tinged with dirty yellow.

Length (h. + th. + t. 1 + 2), 14 mm.

Belgian Congo.—The two specimens described above were obtained at Lukula (J. Bequaert Coll.). Other specimens, which I refer to the same species, were found at Stanleyville, 1 ♀ and 3 ♂♂; Bafwasende, 1 ♀; Avakubi, 1 ♀ and 1 ♂; Medje, 2 ♀♀ and 1 ♂; and Poko, 1 ♀ (Lang and Chapin Coll.).

O. anceps (Gribodo) comes very near *O. ventralis* Saussure, looking somewhat like a diminutive form of that species. The males are easily recognized by the shape of the terminal hook of the antennæ and the middle femora. The separation of the females is much more difficult and the only differences which I was able to discover are given above. It is interesting to note that both species inhabit the same area.

The average size of the 13 specimens of *O. anceps* which I have seen is smaller than that of *O. ventralis*, the length (h. + th. + t. 1 + 2) varying in the female between 14 and 17 mm., in the male between 12 and 14 mm.

Gribodo, in describing *O. anceps*, has stated that this species, of which he knew only the female, might be the other sex of *O. ardens* Guérin, which was originally described on the male. H. de Saussure, however, described the female of *O. ardens* as *Ryghium abyssinicum* Saussure. There is much probability indeed that *O. anceps* Gribodo and *O. ardens* Guérin are synonyms, but the question cannot be satisfactorily settled now because the published descriptions of *O. ardens* and *Ryghium abyssinicum* are too fragmentary.

Ethology. E. Roubaud¹ has given a detailed account of the life history of a wasp which he refers to "*Ryghium anceps* Gribodo."

According to this writer the species burrows in vertical clay surfaces, in house walls, old termite nests, etc., or even appropriates empty clay nests of *Synagris*; a peculiarity of this species is that it always builds a long chimney of clay, recurved downwards, at the entrance of its nest; immediately behind the entrance is an initial, subspherical room in which open four to eight nesting galleries, each composed of eight to thirteen cells. The egg is laid freely or suspended by a thread in the bottom of the cell, which is then very quickly filled up with caterpillars. *Mesostenus tripartitus* Brullé was the only parasite obtained from these nests.

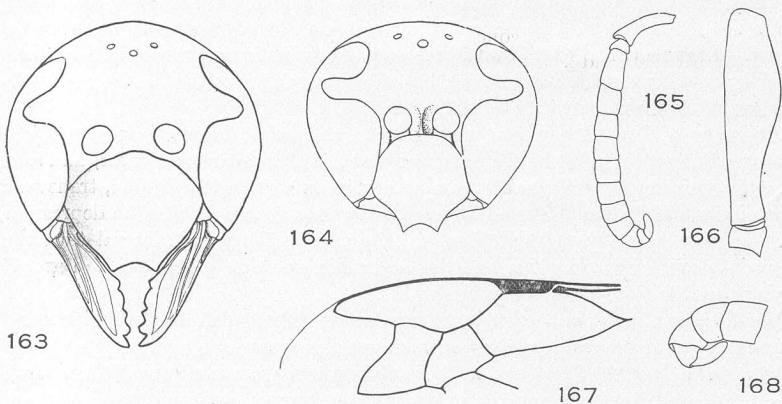
I was able to make similar observations on a nest of *O. anceps* found at

¹ Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 16-20. On p. 18 of Roubaud's paper I am said to have observed in the Lower Congo, *Ryghium abyssinicum* [= *Odynerus ardens* (Guérin)] building a chimney at the entrance of its nest; these observations refer to *O. anceps* (Gribodo) which, as stated above, may, however, prove to be a synonym of *O. ardens* (Guérin).

Lukula, September 1, 1913. This nest was built inside a mushroom-shaped clay termitarium, in the savannah. The entrance of the nest was provided with a chimney of clay, directed downwards, slightly curved at its base, and widened into a funnel at its open end. It was about 4 cm. long and 15 mm. wide at the opening. The base of the chimney led into a small cavity and in different directions from this chamber were found four closed cells: one contained an adult male, the second an adult female, the third a pupa, and the fourth a full-grown larva. No cell with provisions was found. Another nest in the same location was observed near Boma.

48. *Odynerus (Rygchium) carinulatus* Saussure

♀.—Head: Fig. 163. Clypeus very broad, about one and one-half times as broad as long; subelliptic; slightly swollen; moderately narrowed towards its apical margin; this apical margin broad, measuring about one-third of the total width of



Figs. 163–168. *Odynerus carinulatus* Saussure.

Fig. 163. Head in front, ♀. Fig. 164. Head in front, ♂. Fig. 165. Antenna, ♂. Fig. 166. Middle femur, ♂, in front. Fig. 167. Venation of front wing, ♀. Fig. 168. Terminal joints of antenna, ♂.

the clypeus, distinctly emarginate, with projecting, sharp or blunt edges; clypeus without carinæ; very strongly and densely punctate, the sculpture becoming irregularly rugose in its apical half; the punctation much finer towards its upper margin. Vertex much swollen above and behind the eyes; the distance between the lateral ocelli and the hind margin of the vertex about two and one-half times that separating the posterior ocelli from the eyes. On the vertex a flattened crescent-shaped depression extending from near the hind margin of the head towards the upper angle of the eyes, and in this crescent, on the middle line, two very small foveæ broadly separated from each other. Maxillary palpi six-jointed, their four terminal joints

very gradually decreasing in length; labial palpi distinctly four-jointed. Mandibles short and broad; much shorter than the great ocular diameter; with a broad, blunt apex, which is slightly curved downward; four very bluntly rounded teeth on their terminal half, along their inner margin. Antennæ short, with moderately swollen flagellum; third joint short, scarcely one and one-half times as long as the fourth; the following joints as broad as, or broader than, long. Head and thorax uniformly and densely covered with very strong punctures; nearly rugosely reticulate.

Thorax short and broad; subquadrate, as seen from above. Anterior margin of the pronotum truncate; with a distinctly carinate margin, and very strong, sharply projecting, lateral angles. Epicnemial of the anterior legs bordered by a raised carina of the mesopleura, this carina continuing on the mesonotum. Mesonotum with a slight anterior groove on its middle and two very strongly raised carinæ on the middle part of its posterior two-thirds; these carinæ converge towards the scutellum, which they do not reach. Scutellum swollen; pillow-like; very slightly depressed on its middle, where there is a very fine longitudinal furrow; on each side of this middle part the sides of the scutellum are gradually raised to form an indication of very broad, lateral tubercles. The hind margin of the scutellum is rather abruptly truncate, with a very short vertical face devoid of coarse sculpture. Postscutellum much of the same shape as in *O. ventralis* Saussure, but more obsoletely trituberculate, the longitudinal median carina often indistinct. Propodeum also much as in that species but the striation of its concavity is very fine, the concavity being somewhat shining. Legs short and heavy, with broadened anterior tarsi; the middle and posterior tibiae on their outside with strong, but short, spines¹ scattered in the short pile. Venation of the front wings: Fig. 167.

Abdomen dull, with very few, very remote, somewhat flattened and superficial punctures; except in front of the posterior margins of tergites two, three, and four, where they are much stronger and more numerous on a distinctly limited, transverse stripe of the middle line. Second abdominal sternite with a saddle-like depression, which is more strongly marked than in *O. ventralis*, the raised, lateral tubercles ending in a much sharper ridge and the depression showing a deep median groove running towards the base of the sternite.

Head, thorax, and legs, dark ferruginous-brown or brownish-red; with indistinct black tinges (more or less extensive) on the apex and inner margin of the mandibles, on the upper side of the flagellum, on the vertex (where there is often a distinct longitudinal median black line), on the sutures of the thorax, and on the mesonotum. The mesonotum may become nearly entirely black, but the raised carinæ are, as a rule, ferruginous. Abdomen almost uniformly pale orange-chrome; the anterior, vertical face of the first tergite darker brown or black; the second sternite sometimes turning darker. Wings uniformly yellow-ferruginous; the apical half of the radial cell with a dark brown, purplish, effulgent spot.

Length (h. + th. + t. 1 + 2), 11 to 13 mm.

The male has been only very briefly described by Magretti.² The following description of it is made on several specimens from Lourenço Marques, in the collection of the Department of Entomology, Cornell University.

¹ Such tibial spines are very commonly found among fossorial Aculeata; they are rare in the diplopterous wasps, being there best known for several of the Zethinae.

² Ann. Mus. civ. Genova, XXI, 1884, p. 618.

♂.—In its structural characters very similar to the female. Head: Fig. 164. Clypeus more elongate, about as broad as long; subcircular; distinctly swollen on its middle into a feeble transverse ridge; its anterior margin broad, with a deeply arcuate emargination; its lateral projecting edges much sharper than in the female. Clypeus almost impunctate. Vertex much less swollen than in the female; the posterior ocelli scarcely more than twice as far from the hind margin of the head than from the inner margin of the eyes. No hairy foveæ on the vertex. Inner margin of the mandibles with two bluntly rounded, feeble teeth in front of their recurved apex. Antennæ (Fig. 165) slightly longer than in the female; the joints of the flagellum feebly constricted; the fourth, fifth, and sixth distinctly longer than broad. Terminal hook like joint (Fig. 168) short and thick; feebly curved; with a blunt, rounded apex; scarcely attaining the apex of the tenth antennal joint when folded on the under side of the flagellum. Second abdominal sternite as in the female. Legs much more slender than in the female, especially their tarsi; middle femora (Fig. 166) about of the shape of the other femora, only slightly swollen beneath on their apical half; their basal half scarcely depressed and arcuate on their under side, not saddle-shaped. The remaining as in the female.

The coloration also is very much the same as in the female, but the clypeus is ivory-white, becoming somewhat ferruginous towards its margins.

Length (h. + th. + t. 1 + 2), 8.5 to 10 mm.

Belgian Congo.—Malela, 1 ♀, July 1915; Boma, 2 ♀ ♀, June 1915 (Lang and Chapin Coll.).

Odynerus ventralis Saussure and *O. carinulatus* Saussure belong to a group of species evidently closely related to each other and forming a natural section, in which may be included also *O. forticulus* (Kohl), *O. bothriogaster* Schletterer, and *O. anceps* (Gribodo). In all these species the structure and shape of the thorax are very similar, the mesonotum having two raised carinæ; besides, the second abdominal tergite has a saddle-like median depression. In comparing the description given above with that of *Odynerus bothriogaster* Schletterer, it will be apparent that the sculptural characters agree perfectly. I am even inclined to believe that Schletterer's species is only a striking color variety of *carinulatus* Saussure, in which head and thorax are richly ornate with yellow, and the color of the abdomen also becomes partly yellowish.

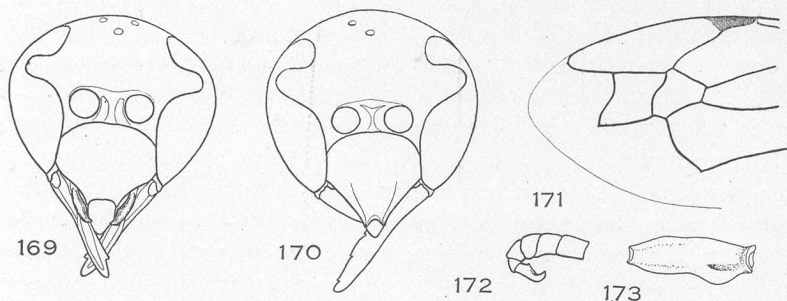
Rhynchium stironotum P. Cameron, from Transvaal, has, according to the author, "two keels down the centre of the mesonotum" and is undoubtedly a synonym of *O. carinulatus* Saussure, which is not rare in South Africa. I have seen numerous specimens of *O. carinulatus* from Lourenzo Marques which agree in every respect with Cameron's description of *R. stironotum*.

Further synonyms of *Odynerus carinulatus* Saussure may be *Rhynchium rubens* Saussure and *Rhynchium rufiventre* Radoszkowsky, but the presence of two raised carinæ on the mesonotum is not clearly indicated in the descriptions of these species.

49. *Odynerus* (*Rygius*) *hyacintæ* Gribodo

I refer to this species one female and one male bred from a clay nest found in the Ituri Forest. Both of these specimens agree sufficiently with Gribodo's excellent description; I shall only call attention to the most important structural characters, since the species may prove to have been described under some other name.

♀.—Head (Fig. 170) of the ordinary shape. The posterior ocelli only slightly more removed from the hind margin of the vertex than from the inner margin of the eyes; distinctly closer to each other than to the eyes. No hairy fovea on the vertex. Clypeus nearly as broad as long; strongly convex; its inferior half with two strong, longitudinal carinæ, which end in sharply projecting teeth on either side of its deeply, arcuately emarginate apex. Mandibles very long, longer than the great ocular diameter; with feebly curved, blunt apex and a faint indication of three notches along their inner margin. Maxillary palpi with their two basal joints very long; the third to sixth successively shorter; the three terminal ones being together slightly longer than the third. The temples behind the eyes are margined by a very sharp raised carina, which, however, stops far from the vertex; the vertex itself



Figs. 169–173. *Odynerus hyacintæ* Gribodo.

Fig. 169. Head in front, ♂. Fig. 170. Head in front, ♀. Fig. 171. Venation of front wing, ♀. Fig. 172. Terminal joints of the antenna, ♂. Fig. 173. Middle femur, ♂.

having no raised margin behind. Third joint of the antennæ not quite one and one-half times as long as the following joint.

Thorax subquadrate; slightly longer than broad, as seen from above. Anterior margin of the pronotum truncate, sharply margined, and with strongly projecting, blunt, lateral angles; much as in *O. carinulatus*. The epicnemialia of the front legs are distinctly depressed and smooth, but the delimiting raised carina is only visible on the inferior half of the mesopleura and on the mesosternum, becoming obsolete in their upper half; these carinæ are much less developed than in *O. carinulatus*. Mesonotum without longitudinal carinæ. Scutellum flat, only feebly swollen towards its middle, with a distinct and narrow median line. Postscutellum short, transverse; its horizontal portion scarcely shorter than its vertical part, the two being separated

by a projecting, sharp, transverse ridge, which is irregularly crenulate; its horizontal part in front of the ridge very coarsely rugose; its vertical part smooth and shining. Propodeum short, not extended behind the postscutellum; its lateral dorsal areas being widely separated on the middle line. Concavity of the propodeum distinct, smooth, and shining. Its lateral and superior ridges are rounded; its dorsal lateral areas not delimited by raised carinæ, rugosely reticulate all over, as are also its ventral lateral areas. The lateral angles of the propodeum are scarcely projecting; rounded and somewhat denticulate; between these angles and the valvula of the abdomen, the inferior ridges of the propodeum are slightly raised and irregularly crenulate. The terminal tooth of each ridge, above the valvula, is much stronger than the others, somewhat widened and obliquely truncate at its apex.

Legs heavily built; the middle tibiæ with a single apical spur; all the tibiæ and femora swollen; the front femora strongly swollen and curved; the middle femora flattened on their anterior face in their basal two-thirds, their apical third presenting anteriorly a strong, elongate expansion. Tibiæ not spiny on their outer face. Wing venation: Fig. 171.

Abdomen broad and short; vertically rounded and truncate on the anterior face of its first tergite. The second sternite strongly depressed on its median, basal part; much as in *O. carinulatus* but its lateral tubercles not so strongly carinate.

Head and thorax opaque; covered with strong, subreticulate punctures, except on the anterior face of the prothorax, on the concavity of the propodeum and the epicnemial depressions of the pleura, which are smooth and shining. Clypeus with a few irregular punctures, becoming somewhat striate between the longitudinal carinæ near its apex. First tergite impunctate; the following tergites with a few superficial punctures uniformly scattered all over, except for a distinct, broad, apical, smooth margin on tergites 2 and 3; the punctation, however, nearly completely hidden by a bright, golden-yellow, appressed tomentum. Punctation on the sternites much stronger, especially on the sternite 2 where it is coarse and remote. Head and thorax with a light, grayish, somewhat silvery bloom; thorax on its upper side with golden tomentum.

Head, thorax and legs deep jade-black; the apex of the clypeus and the under side of the antennal scape ferruginous; the tegulæ brownish-black. Abdomen orange; the vertical, basal face of the first tergite and the larger part of the sternites black. In the specimen I have seen there can be no doubt that the orange-brown color belongs to the integument and not only to the bright golden tomentum. Post-scutellum yellow; wings uniformly smoky, with a bright, golden and purplish effulgence; the veins black-brown.

Length (h. + th. + t. 1 + 2), 11 mm.

♂.—Differs very little from the female. Head: Fig. 169. Clypeus slightly broader than long; scarcely emarginate at its apex which ends in two widely separated, small teeth; without carinæ. Inner margin of the mandibles strongly thickened and raised on its basal third into a projecting lamella which forms a slightly curved, blunt tooth on each side of the labrum. Antennæ elongate; most of the joints of the flagellum longer than broad; the terminal, hook-like joint very long and thickened at its base into a projecting internal tooth, its apex long, curved, and somewhat twisted (Fig. 172); when folded on the under side of the flagellum, the apex of the hook reaches the base of the ninth antennal joint. The middle femora (Fig. 173) have a shape similar to that of the female, but are somewhat more swollen.

Sculpture much as in the female, but the clypeus smooth, impunctate.

Coloration very similar to that of the female. Clypeus and a short streak in the under part of the inner orbits ivory-yellow.

Length (h. + th. + t. 1 + 2), 11 mm.

Belgian Congo.—Penge, 1 ♀ and 1 ♂, bred from a nest, February 16, 1914 (J. Bequaert Coll.).

Vespa aurata Fabricius, which according to W. A. Schulz¹ is an *Odynerus*, may be the same as *O. hyacintæ* Gribodo. Fabricius'² very short description is as follows:

V. nigra, abdomine aureo nitido.

Hab. in Sierra Leon, Africae, D. Pflug.

Statura omnino *V. calidæ* at duplo minor. Caput, thorax, alæ nigra, immaculata. Abdomen subpubescens, aureum, immaculatum. Pedes nigri.

Since Fabricius' type is still in existence in the Copenhagen Museum, it will be possible to fix its identity either with this or with some other similarly colored Ethiopian species. See p. 126 for remarks on several species of *Odynerus* with a similar coloration (group VI).

Ethology. The nest of *O. hyacintæ* was found in the rain forest at Penge fixed beneath the roof of a mushroom-shaped termitarium. It was a free lump of mud in which the cells were placed parallel to each other so as to have their openings all directed upwards. The observed nest had seven cells, a central one surrounded by the six others; the walls of the cells were thin and smooth on their inner side; outwardly the whole of the nest was thinly plastered with a resinous, viscous, black substance, evidently the latex of some plant. A similar nest, probably built by the same species of wasp, was previously found in the forest at Kibombo (November 1910) fixed on the bark of a tree. The prey was not observed.

In general shape and on account of the viscid external covering, the nest of this species is very similar to that of *Odynerus* (*Rygdium*) *nitidulus* (Fabricius) from India.³

50. *Odynerus* (*Rygdium*) *emeryanus* Gribodo

In the collection of the Congo Expedition there is a female *Odynerus* which, for its morphological characters, agrees perfectly with the description and drawings of *O. benitensis* A. v. Schulthess⁴; its coloration differs only in a few minor details. However, in looking over the older descriptions, I

¹ Berliner entom. Zeitschr., LVII, 1912, p. 82.

² Mantissa Insect., I, 1787, p. 289.

³ C. Horne and F. Smith, Trans. Zool. Soc. London, 1870, VII, pt. 3, p. 168, Pl. xx, figs. 1 and 1a.

⁴ Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 348, figs. 10–12.

found the Congo specimen to fit also that of *O. emeryanus* Gribodo.¹ Though Gribodo's description is much less complete, it is still sufficiently clear to allow the conclusion that his species is really identical with *v. Schulthess' benitensis*.

♀.— Head as broad as the thorax; temples on the head as seen in profile about as broad as the eyes, distinctly margined by a raised carina which continues, although less distinctly, behind the vertex. Clypeus slightly broader than long, triangular; very feebly convex and without any trace of longitudinal carinæ; its apex straightly truncate, of the length of the third antennal joint. Posterior ocelli distinctly closer to each other than to the eyes; one and one-half times as far from the hind margin of the vertex as from the inner margin of the eyes. Vertex with a broad and shallow fovea on its posterior half. Third joint of the antennæ one and one-half times as long as the fourth. Mandibles and mouth parts much as in *O. hyacinthæ*.

Thorax almost quadrate, hardly longer than broad as seen from above. Anterior margin of the pronotum sharply margined, with bluntly rounded lateral angles. Epicnemialia of the front legs only faintly margined on the inferior half of the mesopleura. Mesonotum without carinæ or parapsidal grooves. Scutellum flattened, only with a faint trace of a median line in its anterior half. Postscutellum very short, transverse; with an exceedingly short, anterior, horizontal portion, and a much longer, posterior, vertical face; the ridge between both slightly sloping and projecting above the concavity of the propodeum; this ridge is finely and sharply serrulate, and feebly depressed in the middle so as to form two transverse protuberances. Propodeum very short, its concavity feeble. Its lateral, inferior, and superior ridges, as also its lateral angles hardly marked and broadly rounded. No trace of teeth or crenulations above the valvula.

Legs moderately heavy, the tibiæ and femora only feebly swollen and normal. The middle femora without expansion in their apical third, feebly flattened on their posterior face in their basal third. Tibiæ with a row of short, stout spines along their outer face.

Abdomen broad, its first segment slightly narrower than the second. First tergite vertically truncate on its anterior face; its posterior, horizontal part nearly three times as broad as long. Second sternite without median depression or lateral protuberances; rather abruptly vertical towards its base; bluntly rounded between its vertical and horizontal portions.

Punctuation of head and thorax very coarse and dense, almost uniformly subreticulate. Clypeus smooth and shining, with very minute, scattered punctures. Tegulæ shining, very minutely punctate, with a few stronger punctures near their inner margin. Anterior face of the pronotum, epicnemialia of the front and middle legs, and vertical face of the postscutellum, shining and impunctate. Concavity of the propodeum dull, densely and finely striate. Abdomen covered with minute, shallow punctures; those on the first tergite much finer; those on the second sternite coarser; the second and following segments end in a broad, impunctate margin. The entire body is shining, almost destitute of pubescence; the dorsal face of the abdomen especially is very glossy. Head and thorax bear a few grayish hairs, which become longer and somewhat silvery on the lower parts of the temples, on the sternum

¹ Bull. Soc. ent. Italiana, XXIII, 1891, p. 293.

and the angles of the propodeum. Clypeus and dorsal face of the abdomen almost bare. Ventral face of the abdomen and legs with short, scattered, golden-yellow hairs.

Head, including the antennæ, and almost the entire thorax, black. Abdomen entirely and legs for the larger part, bright ferruginous-red (English red of Ridgway's scale); the under side of the abdomen paler. Coxæ and upper face of the tibiæ, brownish-black. Middle part of the mandibles, apex of the clypeus, and under side of the antennal scape, ferruginous. A triangular spot on each side of the basal half of the clypeus, a large spot on the base of the mandibles, two minute frontal dots above the insertion of the antennæ, a stripe in the inferior part of the emargination of the eyes and another in the upper part of the temples, a narrow spot on each side of the middle line near the carinate margin of the pronotum, a rounded spot on the mesopleura near the base of the wings, and a line on each of the elongate protuberances of the postscutellum, cream-buff or ivory-white. Wings uniformly violaceous black.

Length (h. + th. + t. 1 + 2), 10 mm.

According to A. v. Schulthess, the male is very similar to the female. The clypeus is also broadly truncate at its apex. The apical, hook-like joint of the antennæ is very narrow, feebly curved, scarcely reaching the base of the eleventh joint. Base of the mandibles without projecting lamella near their inner margin.

Belgian Congo.—Stanleyville, 1 ♀, March 1915 (Lang and Chapin Coll.).

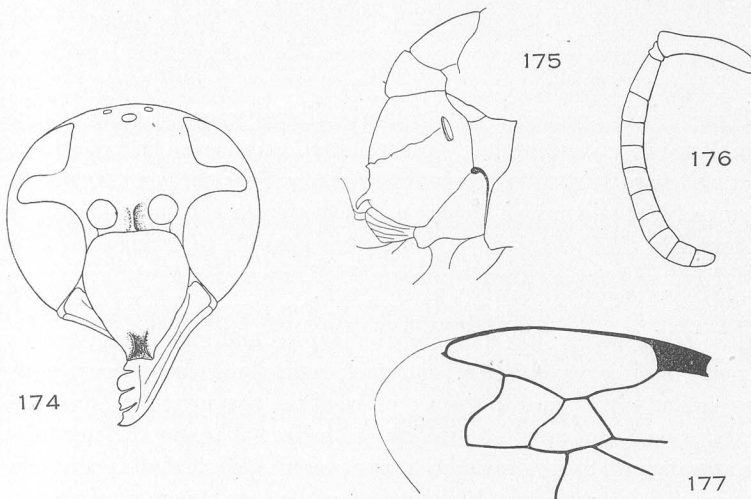
This species is allied to *O. hyacintæ* Gribodo, the chief differences being found in the shape of the clypeus and middle femora of both sexes; and also of the mandibles and apical joint of the antennæ in the male.

O. emeryanus was known from Sierra Leone and Spanish Guinea. Being now recorded from the central part of the Congo basin, it probably ranges over the whole of the West African rain forest.

51. *Odynerus (Rygchium) rufoniger*, new species

♀.—Head (Fig. 174) subcircular. Clypeus slightly higher than broad; piriform; its larger width in its upper third; its lateral inferior margin strongly converging towards its apex; this apical margin narrow, truncate, very feebly sinuate on its middle, with bluntly projecting lateral edges which end in very short, longitudinal carinæ. Vertex moderately developed; with a deep, crescent-shaped, hairy fovea. Posterior ocelli about as far from each other as from the inner margin of the eyes, but more than twice as far from the hind margin of the vertex. Front with a sharp, median carina between the insertion of the antennæ. Temples and lateral parts of the vertex margined by a raised carina, which becomes obsolete on the middle line. Mouth parts very similar to those of *O. synagroides* (Saussure); the labial palpi distinctly 4-jointed; the maxillary palpi 6-jointed, with their three terminal joints very small, together much shorter than their third joint. Mandibles robust; long; beak-like; slightly longer than the great ocular diameter; with three blunt, broad teeth along their inner margin before their pointed apex. Antennæ (Fig. 176) moderately long; their third joint about as long as the fourth and fifth together; their flagellum scarcely swollen towards its apex.

Thorax elliptical; distinctly longer than broad. Pronotum distinctly narrowed towards its anterior margin which bears a feeble transverse carina; its lateral angles bluntly rounded, not projecting. Mesonotum and scutellum flat; no distinct parapsidal furrows; a very narrow, depressed, median line on the scutellum. Post-scutellum feebly convex, sloping almost gradually from its base towards its apical margin; without distinct ridge, teeth, or tubercles. Mesopleura with a carina bordering the epicnemial of the middle legs in their inferior part. Propodeum (Fig. 175) moderately developed; its dorsal areas broadly separated on the middle line by the sloping face of the postscutellum; its superior ridges rounded; its lateral and inferior ridges distinct, but not raised into sharp carinae; its lateral angles very feebly marked, with a small tooth. Below each lateral angle the inferior ridge ends



Figs. 174-177. *Odynerus rufoniger*, new species.

Fig. 174. Head in front, ♀. Fig. 175. Scutellum, postscutellum, and propodeum in profile, ♀. Fig. 176. Antenna, ♀. Fig. 177. Venation of front wing, ♀.

in a long, narrow, strongly curved spine which is directed downwards. Concavity of the propodeum deep; densely covered with fine transverse striae. Dorsal areas of the propodeum rugosely punctate all over; its lateral areas with an extremely minute, transverse striation. Legs normal, rather long and slender; the hind coxae with a fine carina on their upper face but without projecting tooth. Middle tibiae with one apical spur. Claws with a distinct tooth before their apex. Wing venation (Fig. 177) of the ordinary type; the second cubital cell comparatively long.

Abdomen elongate; shaped much as in *Synagris*. First segment only slightly wider than long and broadly convex at its base; nearly hemispherical; its swollen anterior part fitting in the concavity of the propodeum when the abdomen is bent upward. Second segment very much broader than the first, distinctly narrowed towards its base. The second sternite moderately, although distinctly, depressed on its middle; without median furrow; its lateral ridges not carinate and very gradually sloping towards the base (in profile almost as in *O. anceps*, Fig. 154).

Punctuation very coarse and dense on head and thorax; almost reticulately rugose on the postscutellum. Clypeus covered uniformly with very strong elongate punctures, with a very distinct, longitudinal, shining groove between the apical carinæ. Abdomen densely covered with moderately strong punctures, those on the second sternite more remote.

Coloration almost exactly as in *Synagris versicolor* A. v. Schulthess. Deep black; with the clypeus, antennæ, a frontal spot above the median carina, an elongate spot on the temples, pronotum, tegulæ, scutellum, postscutellum, mesopleura, propodeum, legs, and first abdominal segment (except for the apical margins of its tergite), bright ferruginous-red. Mandibles and sutures of the thorax, fuscous. Wings uniformly dark smoky, with a moderate, purplish effulgence.

Length (h. + th. + t. 1 + 2), 13 to 14 mm.

♂ unknown.

Belgian Congo.—Description based on 7 ♀ ♀ from Stanleyville, April 1915 (Lang and Chapin Coll.).

These seven specimens are colored almost exactly alike and their resemblance in coloration, size, general shape, and even in many of their structural characters, to *Synagris versicolor* A. v. Schulthess is very deceiving. Fortunately, specimens of *Synagris versicolor* from the same locality were also found in the collection, so that it was possible to make out definitely the differences between them. Above all, *S. versicolor* A. v. Schulthess is a true *Synagris* as regards the mouth parts (5 joints on the maxillary palpi and 3 on the labial palpi); the shape of the clypeus and mandibles also is very different; but it is, nevertheless, extremely remarkable that these two species are so similar with regard to the structure of the postscutellum, propodeum, and abdomen. One would be inclined to believe that they belong together in a natural group of species and that our present generic distinction between *Odynerus* and *Synagris*, which is merely based on the structure of the mouth parts, is artificial.

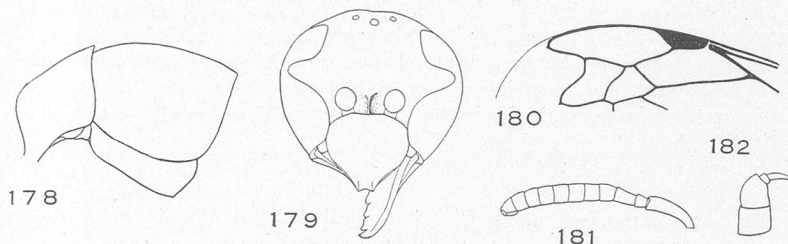
O. rufoniger is still very different from the similarly colored *Synagris rufopicta* Tullgren and *Synagris huberti* Saussure var. *clypeata* (Mocsáry), of which also I have been able to see specimens. I cannot, however, make such definite statements for several other African wasps presenting the same color pattern (See the list of group V, p. 126) and which I know only from the descriptions. *Odynerus uncatatus* (Tullgren) is, I believe, very closely related, if not identical, with the wasp described here as new; but it would be hazardous to unite them at present.

52. *Odynerus* (*Rygdium*) *desperatus*, new species

♀.—Head: Fig. 179. Clypeus shortly piriform; slightly longer than broad; convexly swollen; its apical margin about one-quarter of the total width of the clypeus; subtruncate; very feebly sinuate; with broadly rounded, blunt edges;

these edges with a very feeble longitudinal ridge, but without carina. Inner margins of the eyes distinctly more remote on the vertex than on the clypeus. Vertex normal; with a small, feebly hairy fovea; the posterior ocelli about as far from each other as from the inner margin of the eyes, slightly more remote from the hind margin of the vertex. Temples normal; feebly swollen in their upper part; margined behind by a sharp carina, which continues behind the vertex. Mandibles comparatively short, not as long as the great ocular diameter; with distinctly curved apex; its inner margin with three blunt teeth. Antennæ with comparatively short and swollen flagellum; their third joint short, not one and one-half times as long as the fourth. Mouth parts as in *O. sheffieldi* (Figs. 191 and 192).

Thorax slightly longer than broad; flattened above. Anterior margin of the pronotum truncate; straight; margined by a minute, decolorate carina; its lateral angles broadly rounded. Mesonotum without parapsidal furrows. Scutellum flat; sometimes with a minute median line. Postscutellum transversely triangular; feebly convex; its anterior horizontal portion short; its posterior part gradually sloping; the ridge between both forming a feebly raised, continuous, arcuate line,



Figs. 178-182. *Odynerus desperatus*, new species.

Fig. 178. Two basal abdominal segments in profile, ♀. Fig. 179. Head in front, ♀. Fig. 180. Venation of the front wing, ♀. Fig. 181. Antenna, ♂. Fig. 182. Terminal joints of antenna, ♂.

which is finely crenulate and not depressed on its middle. Propodeum short; almost without median concavity; its sides feebly convex, broadly rounded, without raised ridges or projecting lateral angles. Epinemia of the front legs feebly marked, and the inferior part of the mesopleura with an anterior, faint carina. Legs normal; the hind coxæ with a feeble tooth on their upper face; the claws deeply bifid before their apex. Wing venation: Fig. 180.

Abdomen rather short and heavily built, as in the related species. First segment elongate; cup-shaped; broadly rounded towards its base. Second segment slightly broader than long; its sternite (Fig. 178) convexly rounded towards its base; without median saddle or lateral tubercles.

Punctuation strong and coarse on head and thorax, giving to these parts a rugosely reticulate appearance, especially distinct on vertex, mesonotum, and lateral areas of the propodeum; the punctuation of the clypeus also is abundant, rather superficial, producing a substrate irregular surface, especially towards its apex. Concavity of the propodeum minutely, transversely striate. Tegulæ with a few strong punctures in their posterior part. Abdomen practically impunctate on its dorsal face; the second tergite only with very few superficial punctures, which become more distinct toward its posterior sides. Second sternite very strongly and distinctly punctate.

Coloration, for the most part, dark ferruginous-red, more or less turning into black; the vertex, mesonotum, and base of first and second tergites are mostly black. The yellowish marks are very reduced: a narrow transverse band at the base of the clypeus (sometimes absent); sometimes a small dot on the front or in the emargination of the eyes; a narrow, anterior margin on the pronotum; the extreme anterior angle of the tegulæ; the posttegulæ; an indistinct, transverse band on the post-scutellum; often a small dot on the sides of the propodeum; narrow preapical bands on tergites 1 and 2 and on sternite 2, these bands not broadened on the sides; and a narrow line on the outer side of the front and middle tibiae. There are no lateral free spots on tergites 1 and 2. Wings subhyaline, with a smoky, purplish spot in the radial cell.

Length (h. + th. + t. 1 + 2), 9 to 10 mm.

♂.—Similar to the female. Head and clypeus very much as in the female. The inferior part of the clypeus in front of its apex depressed; flat; somewhat decolorate; its lateral edges more distinctly raised. The apex of the clypeus, therefore, apparently emarginate. Vertex without fovea. Antennæ (Fig. 181) short; their flagellum distinctly swollen; third joint not one and one-half times as long as the fourth; most of the following joints about as broad as long. Terminal hook-like joint (Fig. 182) very small; short and narrow; straight; reaching with its blunt apex to the base of the eleventh joint. Legs normal.

Punctuation as in the female, even on the clypeus.

Coloration also very similar. The yellowish markings are the same, but more distinct; especially the basal band of the clypeus.

Length (h. + th. + t. 1 + 2), 7.5 to 8 mm.

Belgian Congo.—Stanleyville, 1 ♀ and 3 ♂♂, April 1915; Banana, 1 ♂, July 1915; Gamangui, 1 ♀; Poko, 1 ♀ (Lang and Chapin Coll.). Lubutu, 1 ♀, January 1915; Walikale, 1 ♀, January 1915; Lesse, 1 ♀, August 1914; Kambi na Mambuti (between Penge and Irumu), 1 ♀, March 1, 1914 (J. Bequaert Coll.).

The holotype is a ♀ from Stanleyville, the allotype a ♂ from the same locality.

At Kambi na Mambuti these little wasps were commonly nesting in galleries burrowed in wooden pillars of houses; their prey consisted of entire, paralyzed caterpillars.

It is very likely that this species was previously described, since it is of such common occurrence in the Congo forest. Owing to the imperfect descriptions of the majority of African species of *Odynerus* and to the fact that there are apparently in this group numerous species, closely related although distinct, it is impossible in most cases to use any of the published names. The species here described as new was at first thought to be *O. hottentotus* Saussure, to which one is brought by using Meade Waldo's key.¹ However, Dr. H. Brauns has recently sent me the true South African *hottentotus*. The following table shows the most striking differences between these two species:

¹ Trans. Ent. Soc. London, (1914), pp. 489-498.

O. desperatus, new species.

♀ and ♂

Head, as seen in front, scarcely broader than high; the vertex distinctly swollen.

Front with a median carina between the insertion of the antennæ.

Anterior margin of the pronotum raised into a narrow, decolorate lamella.

Mesonotum and scutellum rather flattened above, the mesonotum about as broad as long.

Apical margin of first and second abdominal tergites thin, flattened, decolorate.

Second abdominal tergite gradually convex towards its base.

Sculpture of head and thorax moderately strong; the mesonotum and pleura not rugose. Dorsal face of the abdomen practically impunctate; the second tergite only with a very few superficial punctures.

Pubescence not very dense and not silvery.

♀

Apical margin of the clypeus feebly sinuate, about one-quarter of the total width of the clypeus, its blunt edges feebly carinate.

♂

Apical margin of the clypeus only slightly different from that of the ♀, a little more emarginate.

Terminal joints of the antennæ not excavated beneath, their apical hook small, straight, only reaching to the base of the eleventh joint.

Middle femora normally convex on their front side, without ridge.

Middle tibiæ without dense patch of hairs near their apex.

O. hottentotus, Saussure.

♀ and ♂

Head, as seen in front, distinctly broader than high; the vertex not swollen, feebly raised above the upper edges of the eyes.

Front without median carina, only feebly raised, and flattened between the insertion of the antennæ.

Anterior margin of the pronotum rounded, not lamelliform.

Mesonotum and scutellum slightly convex above, the mesonotum longer than wide.

Apical margin of first and second tergites swollen, the margin of the second slightly reflexed.

Second abdominal tergite much swollen, rather abruptly convex towards its base.

Sculpture very strong on head and thorax; the mesonotum almost longitudinally striate. Dorsal face of the abdomen distinctly punctate all over.

Pubescence dense, long, and silvery, especially on the clypeus, pleura, and propodeum.

♀

Apical margin of the clypeus straightly truncate, about one-third of the width of the clypeus, its edges not carinate.

♂

Apical margin of the clypeus very deeply, semicircularly emarginate, with sharp lateral edges.

Terminal joints of the antennæ excavated beneath, their apical hook long and curved.

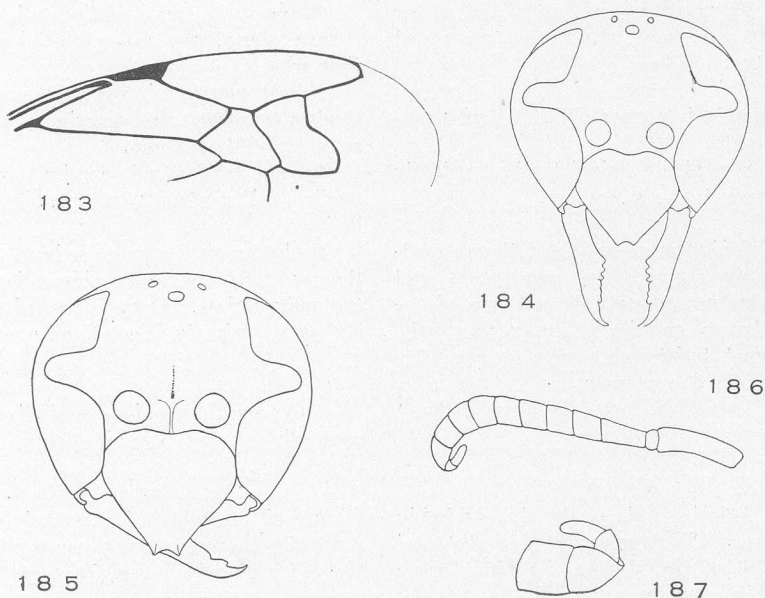
Middle femora distinctly flattened on their anterior and their inferior side, both faces being separated by a sharp ridge.

Middle tibiæ covered with dense and long white hairs along their inner margin in their terminal half.

This table shows also the morphological features by which the true *O. hottentotus* Saussure can be separated from other related species described in this paper.

53. *Odynerus (Rygchium) ueleensis*, new species

♀.—Head: Fig. 185. Clypeus piriform; convex; about as long as broad; distinctly narrowed towards its apex, which has only one-quarter of the width of the clypeus and which is distinctly, although feebly, arcuately emarginate; its



Figs. 183–187. *Odynerus ueleensis*, new species.

Fig. 183. Venation of front wing, ♀. Fig. 184. Head in front, ♂. Fig. 185. Head in front, ♀. Fig. 186. Antenna, ♂. Fig. 187. Terminal joints of antenna, ♂.

lateral edges sharply projecting, raised into short, longitudinal carinae. Vertex broad, with a deep, shining fovea; posterior ocelli as far from each other as from the inner margin of the eyes, much more remote from the hind margin of the vertex. Temples moderately swollen. Temples and vertex margined behind by a sharp raised carina. Mandibles comparatively short, not as long as the great ocular diameter; with three blunt teeth before their feebly curved apex. Antennae of the normal type; their flagellum feebly swollen; their third joint one and one-half times as long as the fourth.

Thorax distinctly longer than broad or high; flattened above. Anterior margin of the pronotum broadly truncate; with a sharply raised carina, which projects as

a minute tooth on each of the lateral angles; these angles otherwise broadly rounded. Mesonotum without parapsidal furrows. Scutellum flat; without any tubercles or carinæ; with a faint trace of median line. Postscutellum transversely triangular; pillow-like; swollen into a transverse, curved, minutely crenulate ridge, which is depressed into a median saddle. Propodeum short; with a swollen median concavity; broadly rounded; without raised ridges or projecting lateral angles. Epicnemialia of the front legs indistinct; not bordered by a raised carina of the anterior part of the mesopleura.

Legs normal. Hind coxæ with a very sharp, erected tooth on their upper face, which is apparently much stronger than in the related species. Claws deeply bifid before their apex. Wing venation (Fig. 183) of the ordinary *Odynerus* type.

Abdomen short and heavily built. Its first segment long, cup-shaped, broadly and convexly rounded towards its base; second segment somewhat broader than long, its sternite gradually depressed towards the base on its middle, without distinct saddle or median furrow.

Punctuation: head nearly impunctate; the punctures are very indistinct on front, vertex, and posterior upper part of the temples; they are strong in the emargination of the eyes and on the inferior and anterior portions of the temples. The clypeus also shows only faint traces of a few scattered punctures, being nearly impunctate. Thorax punctate all over; however, only rugosely reticulate on the dorsal areas of the propodeum; on the rest of the thorax the punctures are distinctly remote from each other. Concavity of the propodeum and mesopleura impunctate; the lateral areas of the propodeum with very few, scattered punctures. Tegulae impunctate, feebly shining. Abdomen practically impunctate on its dorsal face; the second tergite shows only very few, widely distant and very minute punctures scattered all over; on their ventral face, the sternites 2, 3, and 4 present numerous, scattered, strong punctures. The impunctate parts are not shining, but covered with a dull bloom as in *O. angolensis* and *O. desperatus*.

Coloration, for the most part, dark ferruginous-red. A triangular, ocellar spot on the vertex, the apex and inner margin of the mandibles, the mesonotum and the sutures of the thorax, the mesosternum, the second tergite for the most part and some portions of the other segments, the under side of the middle and hind femora, more or less blackish; this color often turns into brownish-red. The clypeus is of a pale yellowish-brown and probably was partly yellow in life. The yellowish markings are much reduced: a narrow band on the posterior margin of the pronotum; part of the tegulae; the larger part of the postscutellum; a spot on the episterna of the mesopleura beneath the insertion of the wings; broad apical bands on tergites 1 to 5, and on sternites 2 to 4; those on tergites 2 to 5 bisinuate in front; the one on tergite 2 much broadened on the sides towards the base of the segment. There are no free lateral spots on tergites 1 and 2. Wings subhyaline, with a bright golden-yellowish tinge and with a dark purplish spot in the radial cell.

Length (h. + th. + t. 1 + 2), 10 mm.

♂.—Very similar to the female. Head: Fig. 184. Clypeus piriform; feebly convex; its narrow, decolorate, flattened apex distinctly, although feebly, emarginate, with rounded, projecting, not carinate edges. Vertex without fovea. Antennæ (Fig. 186) elongate; their flagellum moderately swollen; third joint one and one-half times as long as the fourth, which is distinctly longer than broad; terminal, hook-like joint (Fig. 187) much as in *O. desperatus*, short, narrow, straight, reaching slightly over the base of the eleventh joint. Legs normal; the hind coxæ also with a very sharp tooth above.

Punctuation as in the female; the clypeus entirely impunctate, dull.

Coloration also similar; the yellowish markings richer, covering on the head the whole of the clypeus, a large frontal triangle, a stripe in the lower part of the emargination of the eyes and the outer face of the mandibles; the remainder as in the female.

Length: (h. + th. + t. 1 + 2), 8 mm.

Belgian Congo.—Vankerckhovenville, 2 ♀ ♀, April 1912 (one of them the holotype); Poko, 1 ♂, August 1913 (allotype) (Lang and Chapin Coll.).

This species belongs to the group of *O. bellatulus* Saussure and *O. hottentotus* Saussure, but can readily be separated by the shape of the clypeus and the peculiar punctuation. The differences between the allied species can be seen from the key.

54. *Odynerus* (*Rygdium*) *alboniger*, new species

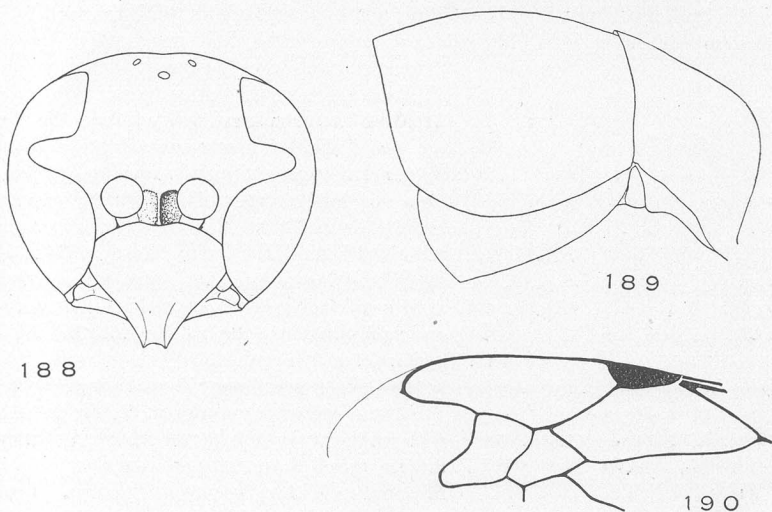
♀.—Head (Fig. 188) subcircular; comparatively broad; slightly broader than the thorax, as seen from above. Clypeus piriform; about as broad as long; convexly swollen in its upper part, depressed in its apical middle portion; its apical margin narrow, more deeply emarginate than in *O. desperatus*, with sharply projecting lateral edges which end in distinct, fine, longitudinal carinæ. Inner margin of the eyes distinctly more remote from each other on the vertex than on the clypeus. Vertex normal; with a deep, but small, almost bare or feebly hairy fovea; the posterior ocelli about as far from each other as from the inner margin of the eyes, nearly twice as far from the hind margin of the vertex. Temples normal; feebly swollen above; margined behind by a sharp carina which continues, but is much less distinct, behind the vertex and is almost invisible on the middle line. Mandibles, antennæ, and mouth parts as described for *O. desperatus* and *O. sheffieldi*.

Thorax much as in *O. desperatus*. Anterior margin of the pronotum sharply raised; mesopleura without raised carina bordering the epinemia of the front legs. Postscutellum with an arcuately curved, finely crenulate, transverse, continuous line which is not depressed at the middle; this raised line is more distinct and more regularly curved than in *O. desperatus*. Propodeum with its lateral, inferior, and superior ridges, and its lateral angles still more rounded than in *O. desperatus*; its dorsal areas passing very gradually into its concavity, so that it is impossible to trace the limits between them.

Legs, wing venation (Fig. 190), and abdomen almost as in *O. desperatus*. Second abdominal sternite very gradually sloping, almost flattened towards its base (Fig. 189).

Punctuation also very similar to that of *O. desperatus*, except for the following points. Punctures of the mesopleura distinctly finer and more remote, the sides of the thorax being shining and almost smooth. Concavity of the propodeum with transverse striæ, which are very distinct in their inferior part, become obsolete above, and pass there into the moderately strong, but dense punctuation of the posterior part of the dorsal areas. The anterior portion of the dorsal areas impunctate, but the smooth part does not form a distinctly limited spot. Lateral areas of the propodeum with very fine, remote punctures.

The coloration is very peculiar and almost identical in the four specimens seen, although they were collected in different localities. Black, with almost pure white or ivory-white markings as follows: a broad basal transverse band on the clypeus; a spot in the emargination of the eyes and on the front between the insertion of the antennæ; a long, narrow stripe on the upper part of the temples; a small transverse spot on each side of the middle line along the anterior margin of the pronotum; a small, round spot on the center and another on the upper part of the mesopleura; a dot on the tegulæ; the posttegulæ; a crescent-shaped transverse band on the basal half of the postscutellum; a large, elongate, vertical band on the angles of the propodeum; narrow, preapical, somewhat sinuate bands on tergites 1, 2, and 4, and a free lateral, small rounded spot near the base of the second tergite; also a



Figs. 188-190. *Odynerus alboniger*, new species.

Fig. 188. Head in front, ♀. Fig. 189. Venation of front wing, ♀. Fig. 190. Two basal abdominal segments in profile, ♀.

lateral spot and an interrupted, preapical fascia on the second sternite; an elongate spot on the outer face of middle and hind coxæ; the under side of the femora; a spot near the apex of the tibiae; and the terminal joint of the tarsi. The apical two-thirds of the clypeus, the antennal scape and the under side of the flagellum, the posterior and anterior margins of the pronotum, and the larger part of the tegulæ, are ferruginous-brown; the sides of the first tergite and the legs are also feebly tinged with brown. Wings subhyaline, darkened in the radial cell.

Length (h. + th. + t. 1 + 2), 9.5 to 10.5 mm.

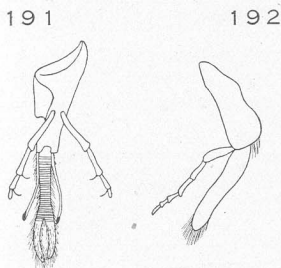
♂ unknown.

Belgian Congo.—The holotype is a ♀ from Thysville, June 1915 (J. Bequaert Coll.). I have also seen 2 ♀♀ from Malela, July 1915 and 1 ♀ from Stanleyville, April 1915 (Lang and Chapin Coll.).

This species is closely allied to *O. desperatus* but, I believe, distinct owing to the slight differences indicated above, which I found to be constant in the four specimens I have seen. It is quite possible that it has been already described, but most of the descriptions of apparently related species are so poor that it is not worth while to compare it with them until the type specimens may be more completely studied.

55. *Odynerus* (*Rygchium*) *sheffieldi* Meade Waldo

♀.—Clypeus much higher than broad; piriform; flattened towards its apex, which is broadly truncate and scarcely sinuate on its middle; with rounded lateral angles and without carinæ. Mandibles about the length of the great ocular diameter;



Figs. 191–192. *Odynerus sheffieldi*
G. Meade Waldo.

Fig. 191. Labium and labial palpi,
♀. Fig. 192. Maxilla and maxillary
palpus, ♀.

their apex blunt, feebly curved; their inner margin with three superficial notches. Vertex well developed; with a small, hairy fovea; the posterior ocelli slightly nearer to each other than to the inner margin of the eyes, much more remote from the hind margin of the vertex. Temples broad; distinctly swollen in their upper part; margined behind, the carina however disappearing behind the vertex. Antennæ with a moderately swollen flagellum; their third joint one and one-half times as long as the fourth. Mouth parts: Figs. 191 and 192.

Thorax much longer than broad or high. Pronotum truncate anteriorly; nearly quadrate; with feebly projecting lateral angles; its anterior margin raised into a feeble, decolorate carina. Mesonotum without parapsidal furrows. Scutellum broad; flat; without tubercles or carina; with a scarcely visible median line. Postscutellum convex; pillow-like; with a curved transverse ridge, which is minutely crenulate or dentate, scarcely or not at all depressed on its middle; without lateral projections. Propodeum short; with a faintly indicated concavity; its sides broadly rounded, without raised ridges or projecting lateral angles.

Legs normal. Hind coxæ with a rounded tooth on their upper face. Claws deeply bifid before their apex; the inner tooth flattened, lamelliform. Wing venation of the ordinary *Odynerus* type.

Abdomen short and heavily built. Its first segment comparatively long; broadly rounded towards its base; its tergite with a feeble median depressed line near its apex. Second segment distinctly broader than long; its sternite convexly rounded towards its base, scarcely depressed on its middle, with a distinct, basal, median furrow.

Punctuation very strong and dense. Head and thorax coarsely, rugosely reticulate; the lateral areas of the propodeum also densely punctate. Clypeus covered with numerous, scattered punctures; on its flattened, median and inferior part the space between the punctures is shining, smooth, and feebly undulate through a

superficial longitudinal striation. The first, second, and third tergites of the abdomen are remotely, but distinctly, punctate all over, the punctation becoming denser and coarser on a preapical zone of tergites 2 and 3; the punctation is much less distinct on the first tergite than on the second. The following segments are nearly impunctate. Tegulae smooth, shining, nearly impunctate.

These structural characters are present almost without variation in 6 ♀♀ from the Belgian Congo and also in 1 ♀ from the Upper Senegal and Niger (Bamako.—E. Roubaud Coll.). The coloration, however, is very variable and each of these seven specimens seems to have its own pattern.

Black, with rich ferruginous-red and yellow markings, the ferruginous color sometimes nearly completely invading the black. The yellow markings are as follows: a broad transverse band at the base of the clypeus; a spot on the front above the insertion of the antennae; a spot at the base of the mandibles; sometimes also a small dot in the upper part of the temples; more rarely the emargination of the eyes and the inner orbits; a more or less extended band on the anterior margin of the pronotum, sometimes much reduced or wanting; rarely also the postscutellum more or less, and indistinct spots on the scutellum or lateral marks on the propodeum; nearly always lateral, large spots in the anterior part of tergites 1 and 2; more or less extended preapical bands on tergites 2 to 4, the lateral spots on tergite 2 being partly fused with the preapical band; and the outer side of the tibiae. At least the following parts are ferruginous: the larger part of the head, with the clypeus, the mandibles, and antennae; the thorax very often nearly entirely, the mesonotum being more or less black; the abdominal sternites nearly completely and the tergites 4 to 6; very often the red color invades partly the tergites 1 to 3; and the legs nearly completely. Wings slightly infusate, with a yellowish-golden tinge, the radial cell with a purplish dark spot.

Length (h. + th. + t. 1 + 2), 8.5 to 10 mm.

♂.—Very similar to the female. Clypeus also elongate piriform; distinctly and broadly truncate at its apex; with the same sculpture as in the female. Vertex without fovea. Antennae moderately elongate, slender; their third joint about one and one-half times as long as the fourth; joints 4 to 8 slightly longer than broad. The flagellum is not rolled up towards its apex; its hook-like terminal joint is long, digitiform, slightly flattened, strongly curved on its middle and somewhat twisted upwardly; its rather blunt apex reaches the base of the tenth joint. Legs normal.

Coloration very similar to that of the female and also variable.

Length (h. + th. + t. 1 + 2), 8 to 8.5 mm.

Belgian Congo.—Thysville, 1 ♀; Stanleyville, 4 ♂♂ and 5 ♀♀; Garamba, 1 ♂; Vankerckhovenville, 1 ♀ (Lang and Chapin Coll.). Boga, 1 ♀ (J. Bequaert Coll.). I have also seen a ♀ from Bamako (Upper Senegal-Niger).

I have followed G. Meade Waldo in separating this species from *O. bellatulus* Saussure on account of the difference in the sculpture of the clypeus and abdomen. The true *O. bellatulus*, which I have not yet seen from the Belgian Congo, has the clypeus also broadly truncate at the apex in both sexes, but the first and second abdominal tergites are smooth, impunctate.

O. sheffieldi is apparently a common species in Central Africa and must have been often confused with *O. bellatulus*, so that it is impossible to indicate its true range.

56. ***Odynerus sheffieldi* var. *marginifasciatus*, new variety**

♀.—The structural characters and sculpture are the same as in the typical form described above; it differs chiefly by the absence of lateral, yellow spots on tergites 1 and 2. Mostly ferruginous-red. Two longitudinal lines on the front connecting an ocellar dot, three triangular spots on the mesonotum (one on its anterior, two on its posterior margin), most of the sutures of the thorax, and the middle part of tergites 1 to 4 and of sternites 2 and 3 more or less extensively, black. The following markings are yellow: a basal band and two preapical spots on the clypeus; a dot near the base of the mandibles; a band on the anterior margin of the pronotum; the postscutellum for the major part; preapical bands on tergites 1 to 3; the one on tergite 1 somewhat triangular, not reaching the sides; the one on tergite 2 widening on the sides; two preapical spots on the sides of sternite 2; and the outer face of the tibiae. The lateral spots on tergites 1 and 2 are bright ferruginous-red instead of yellow.

Length (h. + th. + t. 1 + 2), 9 mm.

Belgian Congo.—1 ♀ from Faradje, January 1913 (holotype), and 1 ♀ from Garamba, July 1914 (Lang and Chapin Coll.).

I name this variety chiefly to have the opportunity of stating that the presence or absence of lateral yellow spots on tergites 1 and 2 cannot be used as a specific character in the group of *Odynerus bellatulus*. It is probable that this variety has been described previously as a distinct species; but since structural characters are so rarely included in the descriptions, it is impossible to decide this at present. The coloration of the var. *marginifasciatus* is somewhat similar to that of *O. desperatus*, but in the latter species the shape and sculpture of the clypeus are distinctly different and tergites 1 and 2 are impunctate.

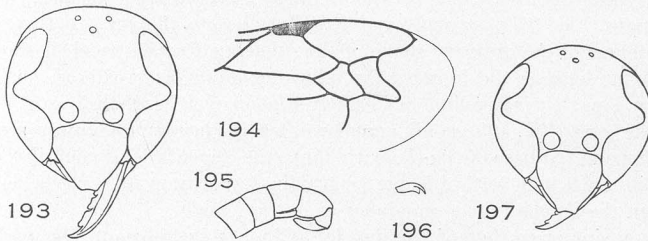
57. ***Odynerus (Rygchium) congolensis*, new species**

♀.—Head: Fig. 193. Clypeus nearly as broad as high; its apex broadly truncate with blunt lateral edges; this truncate apex has about one-quarter of the total width of the clypeus. Front flattened; only feebly raised above the base of the clypeus. Vertex broad; with a small, median, bare fovea; margined behind. Posterior ocelli about as far from each other as from the inner margin of the eyes, much more remote from the hind margin of the vertex. Temples very broad and somewhat swollen in their upper part, gradually narrowed towards the base of the mandibles; margined by a very strong raised carina. Mandibles about as long as the great ocular diameter; scarcely curved at their blunt apex; their inner margin not distinctly toothed, with three superficial notches. Antennae normal; their

flagellum very feebly swollen; their third joint less than one and one-half times as long as the fourth.

Thorax much longer than broad or high. Pronotum broadly truncate into a straight margin, which is finely raised in a decolorate carina; its lateral angles quadrate, but not projecting; the pronotum is only slightly broadened behind its anterior margin. Mesonotum without parapsidal furrows. Scutellum long; quadrate; flat. Postscutellum semicircular; with a broad, anterior, horizontal face, and a much shorter, sloping, posterior part, the two being separated by a very feeble, gently curved, minutely serrulate or dentate, transverse ridge (or rather by a transverse row of minute teeth), scarcely depressed on its middle. Propodeum short; with a feeble concavity; its sides broadly rounded, without raised ridges or projecting angles; its dorsal lateral areas are somewhat produced above the concavity so as to reach each other behind the postscutellum; however, since the hind part itself of the postscutellum is sloping, the propodeum has no horizontal face.

Legs normal; hind coxæ with a tooth on their upper side. Claws (Fig. 196) deeply bifid at their apex; their inner tooth strongly flattened. Wing venation:



Figs. 193–197. *Odynerus congolensis*, new species.

Fig. 193. Head in front, ♀. Fig. 194. Venation of front wing, ♀. Fig. 195. Terminal joints of antenna, ♂. Fig. 196. Tarsal claw, ♂. Fig. 197. Head in front, ♂.

Fig. 194; the third cubital cell comparatively high and narrow; the radial cell short and broad.

Abdomen of the type found in *O. bellatulus* and *O. sheffieldi*. Its first tergite elongate; broadly rounded towards its base; the terminal part with a faint, median, depressed line. Second segment broader than long; its sternite only feebly depressed near the extreme median base, where it presents a short, but strong, longitudinal groove.

Punctuation coarse and dense; subreticulate on head, clypeus, and thorax. The punctuation is much finer and more remote on the first abdominal tergites, although still very distinct and abundant, much stronger on the second sternite. Posterior segments impunctate. Tegulae distinctly punctate.

Black; with very rich yellow markings as follows: clypeus except for a median black spot; a large, elongate, cuneiform spot on the front; spots in the emarginations of the eyes, these spots extending along the inner orbits; the temples nearly entirely; a spot near the base of the mandibles; a very broad, transverse band covering the anterior half of the pronotum; the tegulae; a spot on each side of the scutellum; nearly the whole of the postscutellum; the dorsal areas of the propodeum; a large spot on the mesopleura covering nearly the whole of the episternum; large lateral

spots on tergite 1 and 2, those on tergite 2 fused with the apical band; and preapical narrow bands on tergites 1 to 4, that on tergite 1 triangular, not reaching the sides, that on tergite 4 very short, restricted to the median part. No yellow on the ventral side. The outer side of all the tibiae and of the end half of the front and middle femora are also yellow. The ferruginous-red color is found on the extreme apex of the clypeus, the mandibles, the antennae (except for the black upper part of the flagellum towards its apex; the under side of the scape somewhat yellowish), a large spot on each side of the vertex, the inferior half of the temples, the posterior half of the pronotum, the lateral areas of the propodeum, a large spot on the mesopleura, a minute dot on the metapleura, the whole of the first sternite and the basal part of the first tergite, the sides of the fourth tergite, the whole of the fifth and sixth tergites, the three last sternites for the major part, and the legs except for the yellow markings (the inner side of the middle and hind femora blackish, the coxae with black spots). Wings subhyaline, feebly infumate; the costal and median cell and the stigma bright golden-yellow; the radial cell almost entirely taken by a black, purplish spot.

Length (h. + th. + t. 1 + 2), 8.5 mm.

♂.—Clypeus about as long as broad, broadly truncate at its apex, which is slightly sinuate (Fig. 197); strongly and densely punctate all over. Vertex without fovea. Antennae of the ordinary shape of the subgenus *Rygchium*; their third joint nearly twice as long as the fourth; the following joints as broad as, or slightly broader than, long; their flagellum moderately swollen over its whole length. Terminal, hook-like joint (Fig. 195) small, cuneiform, feebly curved; its blunt apex reaching a little beyond the base of the eleventh joint; the eleventh joint slightly flattened beneath; the tenth joint with a feeble longitudinal groove on its under side. Legs normal, as in the female. The remainder as in the female.

Coloration similar to that of the female. Clypeus entirely and the under side of the antennal scape, yellow. No yellow spots on temples, propodeum, and sides of first tergite.

Length (h. + th. + t. 1 + 2), 8 mm.

Belgian Congo.—Boma, June 1915, 1 ♀ (holotype); and Stanleyville, 1 ♂, April 1915 (allotype) (Lang and Chapin Coll.). Lubutu, 1 ♂, January 31, 1915 (J. Bequaert Coll.).

This species comes in the group of *O. bellatulus* and *O. hottentotus*. Its nearest relative is *O. sheffieldi* G. Meade Waldo, from which it differs chiefly by the punctuation. The clypeus in both sexes is uniformly and densely covered with punctures, without any trace of striae; the front between the antennae is sculptured like the vertex; the dorsal areas of the propodeum are almost rugosely punctate. The punctures on tergite 2 are minute, rather dense, and evenly distributed all over; those on sternite 2 are much stronger and closer together. The shape of the antennal hook in the male is also different.

O. congolensis cannot be the same as *O. harrarensis* G. Meade Waldo, since the latter is described as having the "clypeus with fine longitudinal striae." Other related species are *O. macrocephalus* Gribodo, *O. multicolor* Saussure, and *O. mutans* Saussure, all of which are only superficially known.

58. **Odynerus (Rygchium) falcatus** A. Tullgren

Belgian Congo.—Malela, 5 ♀ ♀, July 1915; Stanleyville, 5 ♀ ♀ and 3 ♂ ♂, April 1915; Kambi na Mambuti (between Penge and Irumu), March 1, 1914, 2 ♀ ♀.

In the last named locality I observed this species nesting in galleries burrowed in the wooden pillars of a rest house and carrying entire, paralyzed caterpillars as prey.

This wasp has been very completely described and figured by A. v. Schulthess under the name *O. 14-maculatus*, and the numerous specimens which I have seen from the Belgian Congo agree in every respect with this description. *O. falcatus* Tullgren is undoubtedly the same species; the description, although much less accurate, is yet sufficiently clear to allow this conclusion.

O. falcatus Tullgren apparently has a very wide distribution, being known from Old Calabar, throughout Cameroon, Spanish Guinea, the Belgian Congo, and Uganda to Mt. Kenia.

Its coloration is very striking. Deep black, with the following very pale yellow or whitish markings: two lateral spots on the clypeus; a large spot on the smooth portion of the dorsal areas of the propodeum; pre-apical narrow bands on tergites 1 and 2, much widened and produced anteriorly on their sides; transverse lateral spots on tergites 3 to 6. The pre-apical bands of tergites 1 and 2 are occasionally interrupted on the middle line. In the male the whitish color covers also the clypeus entirely, the outer face of the mandibles, the under side of the antennal scape, and spots on the legs.

Owing to its structural characters, above all to the shape of the clypeus and the male antennæ, this species belongs in the same group as *O. lateralis* (Fabricius). I believe, however, that it is specifically distinct. The chief differences are in the structure of the propodeum, as indicated in the key. There are also a few minor distinctions in the sculpture of the integument. The clypeus of the female is only faintly, longitudinally striate on its flattened, median part, and the punctures between the striæ are few in number and superficial. The smooth spaces on the propodeum are more extended, in fact cover practically the whole of the dorsal areas; the striation of the concavity of the propodeum is much stronger. The first and second abdominal tergites show a distinct punctation in their posterior part, although the punctures are very scattered. The two following tergites present a broad apical zone of much denser punctures.

Odynerus (Rygchium) lateralis (Fabricius)

There exists in Central Africa a group of variously colored, medium-sized species of *Odynerus*, which agree almost perfectly in their morphological characters. After a careful study of large series of specimens, I propose to consider them all as color varieties of a single species, the structural characters of which are as follows:

♀.—Clypeus broadly piriform; about as broad as long; much narrowed towards its apex, which measures less than one-quarter of the total width of the clypeus; this apex slightly emarginate, with sharply projecting edges in which end strongly raised, but short, longitudinal carinæ. The apical margin itself is strongly depressed; lamelliform between the projecting edges, so that the apex of the clypeus appears to be rather profoundly emarginate. Surface of the clypeus rugose, with a basal zone of scattered punctures; beyond which the punctation is stronger, the pits being somewhat elongate and separated by a maze of irregular longitudinal striæ. Vertex short and narrow; the inner margins of the eyes about as near to each other on the vertex as on the clypeus; the posterior ocelli distinctly farther from each other than from the inner margin of the eyes. Vertex with a large and broad, hairy fovea.

Thorax short and broad; subquadrate; flattened above. Pronotum with a raised carina along its anterior margin; its lateral angles broadly rounded. Scutellum flat. Postscutellum transverse; subtruncate behind; with a short horizontal anterior, and a longer vertical posterior face; the latter is part of the concavity of the propodeum; between both there is a feebly curved, minutely serrulate, continuous ridge. Epicnemial for the front legs feebly marked; not margined behind. Propodeum short; its lateral parts broadly separated by the postscutellum on the middle line; its concavity broad and well-marked, smooth and somewhat shining on its upper part, finely and transversely striate on its inferior half. Lateral, superior, and inferior ridges of the propodeum well marked, crenulate, without sharply raised carinæ; its lateral angles broadly rounded, scarcely projecting.

Abdomen broad and short. Its second sternite feebly depressed on its middle, without distinct lateral tubercles.

Punctation coarse, dense, and subreticulate on head and thorax; tegulæ smooth, impunctate, shining. Very characteristic is a smooth, shining, more or less extended spot on the dorsal areas of the propodeum. Abdomen almost impunctate on its dorsal face; only the sides of tergite 2 and the tergites 3, 4, and 5 with very few, scattered punctures. Punctation on sternite 2 more apparent, although still very scattered.

♂.—Clypeus deeply, semicircularly emarginate at its apex; with sharp tooth-like edges; without carinæ; with only a few scattered, shallow punctures. Vertex slightly broader than in the female; without fovea. Antennæ short; their flagellum distinctly swollen; third joint not one and one-half times as long as the fourth; terminal hook-like joint small, narrow, not curved, its blunt apex reaching the base of the tenth joint. The remaining as in the female.

The following key includes the color variations which I feel sure belong to this structural type:

1. Abdomen without yellow or whitish markings, unicolorous ferruginous-brown or black. East Africa (from Usambara to Portuguese East Africa and Damara-land).....var. *unicolor* A. v. Schulthess.
Abdomen more or less marked with yellow or white.....2.
2. Abdomen brownish-black with two broad, longitudinal, yellow stripes running over the sides of tergites 1 to 6, as in *Odynerus marginellus* (Fabricius). Clypeus of ♀ bright yellow. Senegal, Gaboon, Belgian Congo, Upper Nile.
O. lateralis (Fabricius).
Abdomen ferruginous-brown, without broad, lateral, yellow stripes. Only the lateral angles of some of the tergites with small transverse spots near the apical margin. Clypeus of ♂ entirely yellow. Lower Belgian Congo.
var. *lateropictus*, new variety.

O. lugubris G. Meade Waldo, which I have not seen, is probably also a color form of *O. lateralis* (Fabricius). The abdomen is described as black, with a pale yellow fascia on the apical margin of tergite 2.

59. *Odynerus lateralis* (Fabricius), typical form

The typical *O. lateralis* (Fabricius) is not very rare in the Belgian Congo. I have seen specimens from Coquilhatville, 1 ♀, May 19, 1915; Stanleyville, 1 ♂, April 1915; and Vankerckhovenville, 1 ♂, April 1912 (Lang and Chapin Coll.). Beni, 1 ♀, April 1914; Kasindi, 1 ♀, August 1914; and Kilo, 1 ♀, July 1914 (J. Bequaert Coll.).

Length (h. + th. + t. 1 + 2): ♀, 9.5 to 11 mm.; ♂, 9.5 mm.

G. Meade Waldo has reinstalled the name *Vespa lateralis* Fabricius for *Odynerus truncatus* Saussure, apparently on good grounds.¹ Another synonym of this typical *O. lateralis* (Fabricius) is, I believe, *Rhynchium furax* Kohl.² The details of Kohl's description and the figure which he gives of the head agree in every respect. Kohl records his species from Gaboon and Khartum.

60. *Odynerus lateralis* var. *lateropictus*, new variety

This color form is possibly Radoszkowsky's *Rhynchium ferrugineum*, described from Angola.³ The description, however, is so fragmentary that it seems hazardous to use this name. I was unable to discover any structural or sculptural difference between this variety and the typical *O. lateralis*, although its color markings are very striking.

¹ Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 512.

² Ann. naturh. Hofmus. Wien, IX, 1894, p. 339.

³ Journ. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 205. H. Brauns has sent me, under the name "*Rhynchium ferrugineum* Radoszkowsky," South African specimens of *Odynerus meyeri* Cameron var. *albolimbatus* A. von Schulthess.

♀.—Brownish-black to ferruginous. Rather ferruginous-brown on the head, including the clypeus; the antennæ; the mandibles; the pronotum; the sides of the thorax; the propodeum; and the legs. A spot on the vertex around the ocelli and the terminal half of flagellum of the antennæ above, black. Ivory-yellow preapical, transverse, somewhat triangular spots in the lateral edges of tergites 1 to 4. Wings feebly infusate, with purple effulgence in their apical half; subhyaline in their basal half, where the veins are yellowish; radial cell with a dusky spot. One or more of the lateral, yellowish spots of the abdomen may be absent; I have seen one female where they existed only on the second tergite. The base of the clypeus is sometimes yellowish-brown.

Length (h. + th. + t. 1 + 2), 10 to 11 mm.

♂.—Very similar to the female. The clypeus, a median frontal spot continuing between the antennæ to the base of the clypeus, the inferior margin of the emargination of the eyes, a stripe on the under side of the antennal scape, and the outer face of the mandibles, also pale yellow. Flagellum of the antennæ almost entirely black, their terminal hook ferruginous. The yellowish, lateral spots are sometimes also found on the sides of the fifth tergite and even in the apical lateral corners of sternites 2 to 4.

Length (h. + th. + t. 1 + 2), 7 to 8.5 mm.

Belgian Congo.—Boma, June 1915, 6 ♀♀ and 2 ♂♂ (Lang and Chapin Coll.). One of the females is the holotype.

61. *Odynerus (Rygchium) pseudolateralis* G. Meade Waldo

Belgian Congo.—Faradje, 1 ♀, January 1913 (Lang and Chapin Coll.).

In its color pattern this species is a good mimic of *O. lateralis* (Fabricius). G. Meade Waldo has pointed out its chief differences from that species. In fact, *O. pseudolateralis* comes much nearer *O. meyeri* Cameron, as regards structural characters, being also closely related to *O. dantici* (Rossi). The shape of the propodeum is almost exactly the same in *O. pseudolateralis* and *O. meyeri*, both species having the dorsal areas rugosely reticulate all over and separated from the postscutellum by a deep and broad fissure. The form and sculpture of the clypeus is hardly different and the punctuation of the abdomen, too, is almost the same. I am unable to find any morphological difference between them, so that I am inclined to regard *O. pseudolateralis* as a very peculiar color variety of *O. meyeri*.

62. *Odynerus (Rygchium) meyeri* P. Cameron, var. *albolimbatus* A. v. Schulthess

This wasp is fairly common in the Lower Belgian Congo. I have seen 6 ♀♀ and 9 ♂♂ from Banana, September 1915, and 2 ♂♂ from Boma. I have also seen specimens from Lourenço Marques (Entomol. Dept. of Cornell Univ.).

I do not know the typical *O. meyeri* P. Cameron. G. Meade Waldo¹ brings *O. meyeri* and its var. *albolimbatus* in the group of species without "fissure separating the median segment from the postscutellum"; this is undoubtedly a mistake. In both sexes there is a deep and broad notch nearly completely separating the dorsal areas of the propodeum from the postscutellum; the upper angles of the propodeum are rounded, but distinctly projecting; its lateral angles are also sharply marked. The shape of the propodeum is very similar to that of *O. dantici* (Rossi), but the clypeus is quite different in that species.

I have not seen specimens of *O. rhynchoides* Saussure, so that I cannot point out the real differences between this species and *O. meyeri*. I should not be surprised to find later that *meyeri*, *albolimbatus*, and *pseudolateralis* — and probably some other so-called species — are nothing more than color variations of *O. rhynchoides*.

63. *Odynerus (Rygchium) tropicalis* H. de Saussure

This species is one of the most common in the Ethiopian region and is easy to recognize.

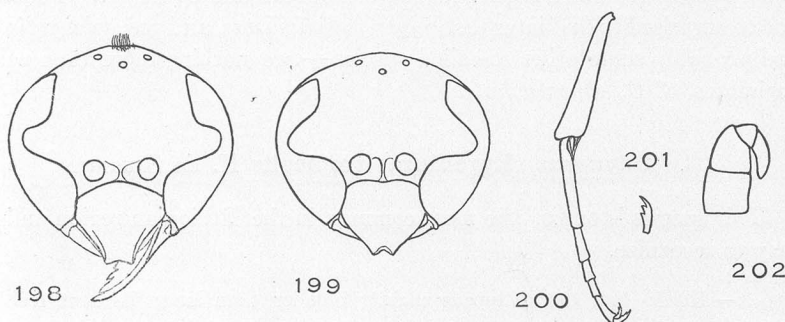
♂.— Head: Fig. 199. Clypeus slightly broader than long; its apex feebly, arcuately emarginate; the emargination apparently deeper through the presence of a preapical, depressed and discolored lamella. Posterior ocelli about as far from each other as from the inner margin of the eyes. No hairy depression on the vertex. Temples with a strongly raised margin; the vertex, however, not margined behind. Mandibles with four teeth along their inner margin and a pointed, feebly curved apex. Flagellum of the antennæ slightly swollen; its terminal hook (Fig. 202) small, short, unguiform, scarcely curved; its bluntly pointed apex reaching slightly beyond the base of the eleventh antennal joint; the tenth antennal joint without excavation beneath. Pronotum with a very slightly raised margin on its anterior border; its lateral angles distinctly projecting. Scutellum transverse; slightly swollen; pillow-like; with a narrow depressed median line; its lateral posterior angles more or less raised into a tubercle, a spine, or a sharp longitudinal carina; this offers a great deal of variation, the lateral tubercles being often scarcely visible. Postscutellum with strongly projecting, long, and sharp lateral spines; these spines are somewhat flattened from the sides and placed obliquely so as to form the lateral endings of a narrow transverse carina of the anterior part of the postscutellum. The postscutellum is nearly entirely vertical, forming a part of the concavity of the propodeum. Propodeum short; its lateral angles broadly rounded; its apical teeth above the valvula of the abdomen very strong, curved upward; no raised lateral and inferior ridges; the concavity of the propodeum, however, separated from the dorsal lateral area by a distinctly raised, but very fine, superior ridge. Legs slender, normal; the hind coxæ with a sharp tooth on their upper side; the basitarsus of the

¹ Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 494.

hind legs (Fig. 200) normal. The claws bifid at their apex and with a distinct third tooth on the middle beneath (Fig. 201).

Punctuation uniformly dense and coarse all over, very coarse on front, mesonotum, scutellum and tegulae; reticulately rugose on the sides of the propodeum; the punctuation is finer, but very dense, on the second tergite; clypeus with numerous, coarse punctures; concavity of the propodeum very densely punctate, not shining. Second sternite somewhat flattened and feebly convex towards its base, where it is rather abruptly oblique, very coarsely punctate. Terminal sternites minutely punctate, the base of the fourth and fifth with a dense patch of long, decumbent, bright hairs. Wing venation similar to that of *O. kabarensis*.

Some specimens are colored almost like the female, but the clypeus is always entirely yellow. Very often, scutellum and postscutellum have each a transverse



Figs. 198-202. *Odynerus tropicalis* Saussure.

Fig. 198. Head in front, ♀. Fig. 199. Head in front, ♂. Fig. 200. Hind tibia and tarsus, ♂. Fig. 201. Tarsal claw, ♂. Fig. 202. Terminal joints of the antenna, ♂.

yellow band; as a rule, the fourth to sixth tergites show an apical yellow band. The ferruginous color may be much reduced, but even then the apical segments of the abdomen are partly reddish.

Length (h. + th. + t. 1 + 2), 5 to 7 mm.

♀.—Very similar to the male. Head: Fig. 198. Clypeus nearly truncate at its apex or more or less arcuate; there is some variation as regards this, the Fig. 198 representing the most common type among the Congo specimens; there are two feeble, strongly diverging, longitudinal carinae, starting from the outer edges of the apical truncature and completely disappearing below the middle of the clypeus. Vertex with two very small excavations, in front of which is a dense patch of long, erect hairs. Mandibles with four teeth along their inner margin and a sharp, scarcely curved apex. The lateral tubercles of the postscutellum are, as a rule, more distinct than in the male, sometimes carina-like. No hairy patches on the fourth and fifth abdominal sternites. Tarsal claws more deeply bifid at their apex, also with a third median tooth. Punctuation as in the male; the clypeus with scattered, somewhat elongate punctures, giving it a substriate appearance.

Black, very extensively marked with ferruginous, both these colors intergrading. The ferruginous-red color covers the following parts: the clypeus except for a basal transverse yellow band; the mandibles; a transverse band on the front; the temples

and the hind part of the vertex; the antennæ except for the upper face of the flagellum; the upper face of the pronotum; the tegulæ; a large spot on the mesonotum behind; a transverse band on scutellum and postscutellum; the major part of the propodeum and metapleura; three large spots on the mesopleura separated by the epimeral and episternal black sutures; the sternites of the abdomen nearly completely; two lateral spots on tergites one and two; the following tergites almost entirely; and the legs except for the yellow markings on femora and tibiæ and a few blackish dots on the tibiæ and tarsal joints. The ferruginous markings may be much less extensive, being then mostly replaced by black; especially the lateral spots on the second tergite may become very small or disappear. Very frequently there is a small, rounded, black dot in the center of the clypeus. In all the females I have seen, the three terminal abdominal segments are, at least partly, ferruginous.

The yellowish-white markings are as a rule restricted to a basal transverse band on the clypeus, a frontal spot above the insertion of the antennæ, the emarginations of the eyes, a small dot on the temples, a short transverse band in the middle of the pronotum, the posttegulæ, small lateral dots on the scutellum, an apical band on the first tergite and on tergite and sternite two, the outer side of the tibiæ, and a spot near the apex of the femora. In some specimens there are also yellow spots on the tegulæ and on the mesopleura beneath the wings, or there is an apical band on tergite three; very rarely one finds yellow lateral dots on the postscutellum. Many of these yellow markings can be more or less extensive; e. g., the yellow markings on the front and in the emargination of the eyes may fuse into a transverse, continuous band; or the dots on the scutellum may invade nearly the whole of its surface.

Length (h. + th. + t. 1 + 2), 6.5 to 8 mm.

Most of the females agree very well, as regards the coloration, with the original description and the figure of H. de Saussure.¹ The males have, as a rule, the ferruginous color less extended and the yellow markings more numerous.

Belgian Congo.—Numerous specimens from Malela, Boma, Coquilhatville, Stanleyville, Lubutu, Walikale, Lesse, Medje, Faradje, Aba, Akenge, and Garamba.

Mr. Lang collected several females in Faradje, October 1912, where they were drilling nesting holes into the brick walls of the houses.

Ethology. *Odynerus tropicalis* Saussure was thoroughly studied by Roubaud in the Dahomey.² This little wasp has a very remarkable life history: through its peculiar habit of feeding its larvæ from day to day with living, paralyzed caterpillars, it forms a type of its own, although it is probable that other tropical solitary wasps behave in a similar way. This species burrows in clay walls. Its galleries are small, 3 to 4 cm. long, 3 mm. in diameter; as a rule bifurcate, each of the branches containing one, rarely two cells; at the entrance of the gallery is built an elegant funnel of clay which is removed when the nest is closed. After oviposition, the mother wasp waits till the egg hatches or is ready to hatch and then brings the first

¹ Et. fam. Vesp., I, Eum., 1852, p. 214, Pl. xix, fig. 5, ♀.

² Ann. Sc. nat. Zool., (10), I, fasc. 1, 1916, pp. 37-43.

provisions; but the supplying of food is always slow, the mother watching the growth of the larva and proportioning the prey to the size of her young. She closes the cell, without additional provisions, only when the larva is full-grown and ready to pupate. A further very interesting fact shown by this species is the tendency of the mother wasp to care for several larvæ at the same time: very often she starts a new burrow in the vicinity of the cell in which she is still nursing a larva; even before this larva is full-grown, she may lay an egg in this new cell and then for a time nurse two larvæ simultaneously. *Mesostenus tripartitus* Brullé is a parasite of this wasp.

The following two new species are closely related to *Odynerus sjöstedti* P. Cameron and it was believed at first that one of them was that species. They belong to the group of *O. silaos* Saussure in which the females are very similar, sometimes almost impossible to separate; the males present, as a rule, striking characteristics.

G. Meade Waldo¹ makes *O. yngvei* Cameron, ♂, the male of *O. sjöstedti* Cameron ♀; whereas A. v. Schulthess² considers both as distinct species and describes, furthermore, the true male of *O. sjöstedti*; the female of *O. yngvei* is apparently still unknown. I have followed A. v. Schulthess since this author gives the difference in the shape of the hind basitarsus as separating the two species in the male sex.

64. *Odynerus* (*Rygdium*) *kabarensis*, new species

♂.—Head (Fig. 204) normal; the posterior ocelli about as far from each other as from the inner margin of the eyes. Vertex without hairy fovea. Clypeus convex; about as broad as long; feebly, arcuately emarginate at its apex; with bluntly rounded lateral teeth; without carinæ. Mandibles moderately long; with four superficial teeth along their inner margin and a feebly curved apex. Temples and vertex behind margined by a fine raised carina. Antennæ with swollen flagellum; its terminal hook-like joint (Fig. 206) small, unguiform, feebly curved, its rather pointed apex not reaching the base of the tenth joint; third antennal joint one and one-half times as long as the fourth.

Thorax distinctly longer than wide. Pronotum without raised anterior margin; its lateral anterior angles feebly projecting. Epinemia for the front and middle legs deeply depressed; those of the front legs margined in their inferior half by a feebly raised carina which runs over the mesosternum. Scutellum flat; transverse; with a very feebly raised tubercle on each side in its posterior angles. Postscutellum narrow; almost completely vertical; with two very feeble lateral spines, which are mere transverse tubercles, flattened from behind and slightly raised above the anterior margin of the postscutellum. Propodeum short; with a distinct concavity and rounded ridges; without lateral projecting angles. Legs long and slender; the

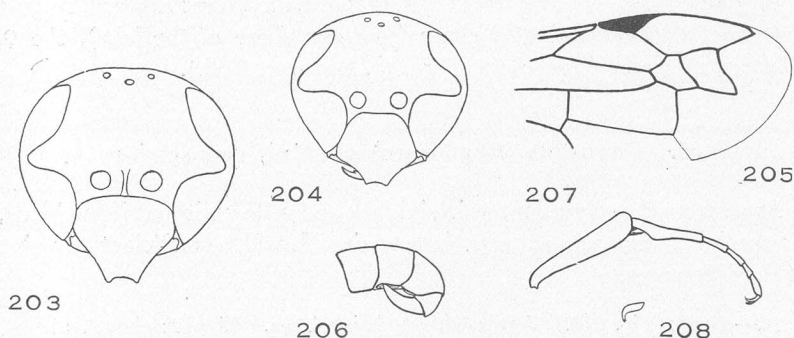
¹ Ann. Mag. Nat. Hist., (8), XI, 1913, p. 53.

² Ark. f. Zool., VIII, No. 17, 1913, pp. 15 and 18.

femora feebly swollen; the hind coxæ with a sharply projecting tooth on their upper face. Basitarsus of the hind legs slightly curved on its outer side, with a projecting expansion before its middle on its inner side (Fig. 207). Claws of the tarsi (Fig. 208) almost simple; their apex scarcely bidenticulate. Wing venation: Fig. 205.

Abdomen elongate. Its first segment slightly narrower than the second; cup-shaped; very gradually sloping towards its base. Second tergite distinctly swollen on its middle; with a feebly raised longitudinal ridge, which can easily escape notice; second sternite feebly raised, broadly rounded towards its short vertical, basal face.

Punctuation nearly uniformly covering head, thorax, and abdomen. The posterior abdominal sternites, beginning with the third, present only a few minute punctures. The hind margins of tergites one and two are impunctate and slightly thickened. The punctuation is much coarser on pronotum, tegulæ, mesonotum, and scutellum; much finer on the head, especially on the front. Concavity of the



Figs. 203-208. *Odynerus kabarensis*, new species.

Fig. 203. Head in front, ♀. Fig. 204. Head in front, ♂. Fig. 205. Venation of front wing, ♂. Fig. 206. Terminal joints of antenna, ♂. Fig. 207. Hind tibia and tarsus, ♂. Fig. 208. Tarsal claw, ♂.

propodeum and posterior face of postscutellum shining, nearly impunctate; the sides and dorsal areas of the propodeum with scattered coarse punctures. Clypeus impunctate, nearly smooth.

Black. Clypeus, mandibles, a large spot between the antennæ on the front, the anterior half of the antennal scape, the emargination of the eyes, a spot in the upper part of the outer orbits, a transverse band on the pronotum much dilated on the sides, an ill-defined dot on the mesopleura under the base of the wings, the posttegulæ, the tuberculate lateral spots on scutellum and postscutellum, apical bands on the first tergite and on tergites and sternites two to six (the band on the first tergite narrower than the others, those on tergites two to four slightly bisinuate in front), the outer margin of all the tibiæ, a small external dot near the apex of the femora, and the tarsi for the most part, yellowish-white. The apical joint of the tarsi darkened, but not quite black. The under side of the antennal flagellum and its terminal hook are ferruginous-yellow. Lateral hind angles of the pronotum, the tegulæ, the margins of the yellow mesopleural spot, broad lateral spots on the propodeum, lateral spots on tergites 1 and 2 (those on the first tergite extending towards the

posterior margin), the legs except for the yellow markings, ferruginous-red. Wings nearly hyaline; with black veins and stigma, and a black spot on their anterior margin near their apex.

Length (h. + th. + t. 1 + 2), 6 mm.

♀.—Very similar to the male. The feeble longitudinal carina on tergite two and the lateral flattened spines of the postscutellum are somewhat more developed than in the male. Clypeus (Fig. 203) broader than long; its apex very feebly sinuate, nearly truncate, with bluntly rounded edges; its surface with a very few scattered punctures. Basitarsus of the hind legs without expansion. The claws of the tarsi are deeply bifid at their apex.

Clypeus whitish-yellow, except for the ferruginous apex; the under side of the antennal scape more ferruginous.

Length (h. + th. + t. 1 + 2), 6.5 mm.

Belgian Congo.—A pair from the shores of Lake Albert Edward, August 1914: the ♂ (holotype) at Kabare (southern shore of the lake), the ♀ (allotype) at Kasindi (northern shore) (J. Bequaert Coll.).

65. *Odynerus (Rygius) chapini*, new species

Apart from the coloration, which is black and yellow without ferruginous, this species is very similar to *O. kabarensis*. It will be sufficient to point out the differences.

♂.—Head: Fig. 210. Vertex without hairy fovea. Clypeus about as broad as long; its apex deeply and arcuately emarginate, with projecting lateral edges; the emargination appears deeper than it really is, for the clypeus ends in a broad translucent margin. Terminal hook-like joint of the antennæ (Fig. 211) short; thick; distinctly curved and feebly twisted; flattened on its under side; scarcely reaching the base of the tenth joint. Lateral angles of the pronotum distinctly projecting. Scutellum without lateral tubercles. Lateral spines of the postscutellum much stronger and sharper than in *O. kabarensis*; however, also flattened from behind. Second abdominal tergite with scarcely any trace of a median longitudinal ridge. Basitarsus of the hind legs feebly, although distinctly, expanded on its inner side (Fig. 212). Claws (Fig. 213) scarcely bifid at their apex. Wing venation as in *O. kabarensis*.

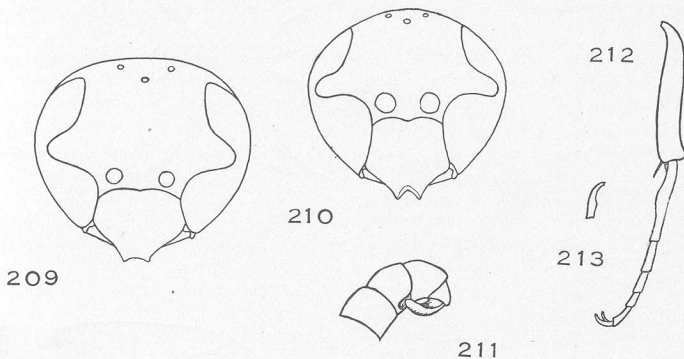
The punctuation is strong and coarse over the whole body, much stronger than in *O. kabarensis*; this is especially noticeable in comparing the sculpture of the front and second abdominal tergite. The clypeus also is very distinctly punctate. The last abdominal sternites are nearly impunctate and have no long fringes of hairs. The smooth apical margin of tergite 2 is scarcely thickened.

Black, with the following yellowish-white markings: the mandibles for the major part; the clypeus; a triangular spot between the insertion of the antennæ; the emargination of the eyes; an elongate dot on the upper part of the temples; the under side of the antennal scape; a narrowly interrupted transverse band on the anterior margin of the pronotum; the tegulæ except for a median black spot; the posttegulæ; a minute spot on each side of scutellum and postscutellum; a large spot

on the mesopleura beneath the insertion of the wings; apical bands on tergites one to six and on sternite two, those on tergites 1 and 2 broader and somewhat widened on the sides; and the legs with the exception of the coxæ and basal half of the femora. The apex of mandibles, the under side of the flagellum, and the tarsi, more or less ferruginous; the terminal joint of the hind tarsi dark brown, not quite black. Wings hyaline; feebly darkened towards their anterior margin; with a bluish smoky spot near their apex.

Length (h. + th. + t. 1 + 2), 6.5 mm.

♀.—Very similar to the male; the clypeus (Fig. 209) not so deeply emarginate, with less projecting lateral teeth. The second abdominal tergite with a feeble, although distinct, longitudinal, raised ridge. Basitarsus of the hind legs without expansion. Tarsal claws deeply bifid at their apex. Punctuation coarse, as in the



Figs. 209–213. *Odynerus chapini*, new species.

Fig. 209. Head in front, ♀. Fig. 210. Head in front, ♂. Fig. 211. Terminal joints of antenna, ♂. Fig. 212. Hind tibia and tarsus, ♂. Fig. 213. Tarsal claw, ♂.

male, especially on the clypeus where the punctures become elongate and give to the surface a rugosely substriate appearance. The color markings are much the same as in the male; the clypeus is black with a broad basal yellow band, and in one specimen also with two preapical spots.

Length (h. + th. + t. 1 + 2), 6.5 to 7 mm.

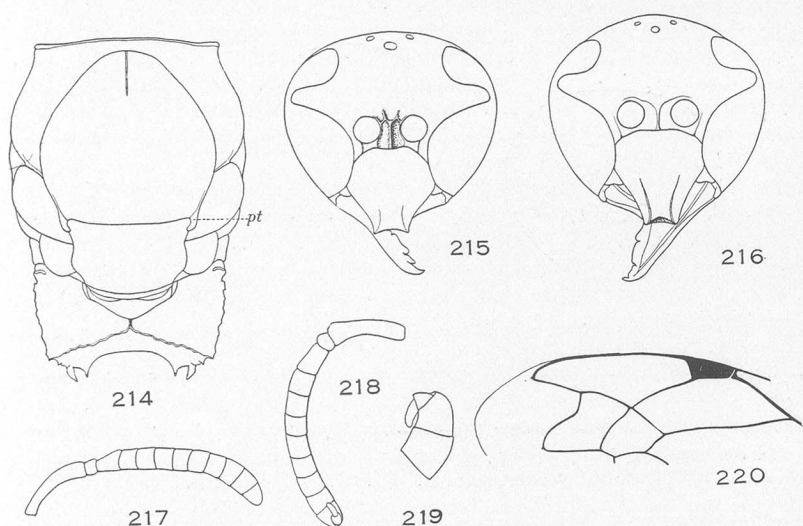
Belgian Congo.—Stanleyville, February to April 1915, 4 ♂♂ and 5 ♀♀ (Lang and Chapin Coll.). One of the ♂♂ is the holotype.

O. kabarensis and *O. chapini* may be easily separated in the male sex by the characters given in the descriptions. The females of these two species are much more similar: apart from the coloration, which may be variable, the punctuation is very different, especially on the clypeus and front.

As far as the male is concerned, *O. sjöstedti* seems to be intermediate, in the shape of the hind basitarsus, between *O. chapini* and *O. kabarensis*, the expansion being stronger than in *O. chapini*. The published descriptions of *O. sjöstedti* do not permit a further comparative study of these three species.

66. *Odynerus (Rygchium) histrionimimus*, new species

♀.—Head (Fig. 216) subcircular; slightly broader than the thorax. Clypeus about as broad as long; piriform; its surface strongly convex in its upper half; flattened in its terminal part. The apical margin of the clypeus broad, nearly straight or faintly sinuate, measuring at least one-third of the total width of the clypeus, with broadly rounded and feebly projecting lateral edges. From each of these edges starts a curved, strong, longitudinal carina, which runs about to the middle of the clypeus. Vertex well developed, long, feebly convex, with two confluent, hairy foveæ on its middle; the posterior ocelli distinctly more remote from the inner margin of the eyes than from each other and nearly twice as far from the hind margin



Figs. 214–220. *Odynerus histrionimimus*, new species.

Fig. 214. Thorax from above, ♀: *pt*, posttegula. Fig. 215. Head in front, ♂. Fig. 216. Head in front, ♀. Fig. 217. Antenna, ♀. Fig. 218. Antenna, ♂. Fig. 219. Terminal joints of antenna, ♂. Fig. 220. Venation of front wing, ♀.

of the vertex. Front with a short, but sharp, median carina above the clypeus. Temples very sharply margined behind, the carina becoming obsolete or disappearing in the upper part of the head, behind the vertex. Mouth parts: labial palpi 4-jointed, their basal joint comparatively long and slender, their fourth joint well developed; maxillary palpi 6-jointed, their four terminal joints successively shorter, their two terminal ones almost subequal. Mandibles robust, moderately long, beak-like, shorter than the great ocular diameter, with irregular notches along their inner margin. Antennæ (Fig. 217) short; their flagellum distinctly swollen, not twice as long as their scape; the third antennal joint only a little longer than the fourth; joints 4 to 11 as broad as or broader than long.

Thorax (Fig. 214) elongate; excluding the propodeum, longer than broad, as

seen from above. Pronotum with a straight anterior margin, which is provided with a strong raised carina; this carina becomes lamelliform on the blunt, feebly projecting, lateral angles of the pronotum and continues beneath on the sides. Mesonotum and scutellum flat, without grooves or carinæ; the anterior half of the mesonotum with a feeble median depressed line. Postscutellum short, transversely triangular, on the same level as the scutellum, and entirely horizontal; it presents in its anterior part a slight transverse ridge, which is feebly crenulate and slightly depressed on its middle line. Propodeum comparatively elongate, especially on its sides; with a median horizontal area behind the postscutellum; the dorsal areas meeting there in a feeble longitudinal groove. The posterior concavity of the propodeum is very deep and well marked; its lateral, superior, and inferior ridges, as well as its lateral angles, being very strongly marked; on each side of the insertion of the abdomen the inferior margin of the propodeum ends in a curved tooth preceded by a series of 3 or 4 irregular spines. Mesopleura with distinct sutures separating the epimera and dividing the episterna in an upper and an under part; a very strong, sinuate, vertical carina borders, on the anterior part of the mesopleura, the epicnemium of the front legs; this carina disappears gradually towards the middle of the mesosternum; there is also an indication of a ridge in the posterior part of the mesopleura, in front of the epicnemium of the middle legs.

Legs, especially those of the front pair, comparatively short and thick, normal; the middle tibiæ with one apical spur; the tarsal claws bifid. Coxæ of the hind legs without tooth on their upper face. Wing venation of the *Odynerus* type (Fig. 220); but the second cubital cell strongly triangular in shape, its margin on the radius very short or absent; the two first intercubital nervures meeting on the radius; the second cubital cell sometimes even subpetiolate.

Abdomen elongate. Its first segment long, broadly convex at its base, nearly hemispherical; its swollen, basal part filling the concavity of the propodeum when the abdomen is bent upward. Second segment distinctly broader than the first, but without constriction at its base; the second and third tergite ending in a narrow, feebly raised lamella. Second sternite feebly and gradually depressed in its basal half on its middle; its basal, constricted neck with a row of fine, longitudinal ripples.

Punctuation very coarse, dense and uniform on head and thorax, almost reticulately rugose. Clypeus with scattered strong punctures in its upper convex part and with irregular longitudinal striæ in its depressed portion between the carinæ. Tegulæ impunctate. Concavity of the propodeum without strong sculpture, very minutely, transversely striate; its dorsal lateral areas very coarsely and rugosely reticulate, with a distinct smooth space in its anterior lateral angle, above the stigmata. Punctuation of the abdomen much finer than on the thorax and more remote; rather indistinct on its first tergite; more uniformly distributed on the following segments; the punctures on the depressed, median part of the second sternite stronger, but not so close.

Body covered with a grayish bloom and a few short, white hairs; the vertex and front with a denser, brownish pile.

Black, with the following ferruginous-red markings: the clypeus; the mandibles; the scape of the antennæ; the pronotum; the tegulæ; the postscutellum; the propodeum; the legs; the base and sides of the first tergite and the whole of its sternite; and often also a small spot on the sides of the second tergite near its base. Front wings hyaline from their base to the origin of the basal nervure, the remaining being dark brown with a bright purplish effulgence; in the hind wings the basal half is hyaline, the apical half purplish-brown.

Length (h. + th. + t. 1 + 2), 10.5 to 11.5 mm.

♂.—Agrees with the female in almost every respect, including coloration. The clypeus (Fig. 215) is ferruginous-red, not yellow, and densely clothed with short, silvery hairs; it has almost the same shape as in the female, but the longitudinal carinae are very short and its surface presents no strong sculpture, the punctation being microscopical and hidden beneath the dense, silvery cloth of pile. No hairy fovea on the vertex. Antennae (Fig. 218) short and thick; their apical hook-like joint (Fig. 219) very small, digitiform, straight, gradually tapering towards its blunt apex, which reaches the base of the eleventh joint. Legs normal.

Length (h. + th. + t. 1 + 2), 9 to 11 mm.

Belgian Congo.—Banana, August 1915, 18 ♀♀ and 9 ♂♂ (Lang and Chapin Coll.). The holotype is a ♀. The species is apparently one of the most common wasps at the mouth of the River Congo; it is surprising that it was not found in any other locality.

This wasp comes in the division *Stenodynerus* of the subgenus *Rygdium*, owing to the presence of a well-marked horizontal area formed by the propodeum behind the postscutellum. Among other African *Stenodynerus*, it comes apparently near *O. corvus* G. Meade Waldo, but the shape of the clypeus in that species is very different.¹

The coloration of *O. histrionimimus* is almost exactly that of *Odynerus* (*Rygdium*) *histrionicus* (Gerstaecker), of which I have seen numerous specimens from Delagoa Bay in the collection of Cornell University. But *O. histrionicus* can be recognized at once by the shape of the postscutellum which forms the anterior margin of the concavity of the propodeum (the propodeum having no horizontal median area), by its impunctate abdomen, by the different shape of the clypeus which is ivory-white in the male, etc.

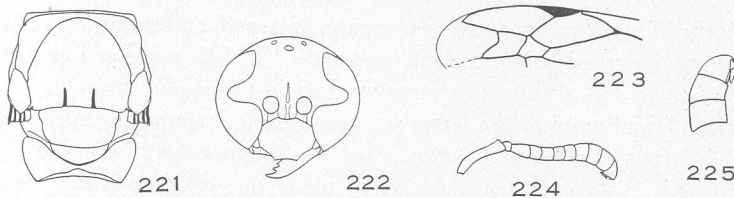
67. *Odynerus* (*Rygdium*) *rhizophorarum*, new species

♂.—Head: Fig. 222. Clypeus much broader than long; feebly convex; with a very broad, straightly truncate apex, which has more than one-third of the total width of the clypeus; edges of its apical margin acute, distinctly projecting. Vertex normal, without fovea, not margined behind; the posterior ocelli about as far from each other as from the inner margin of the eyes, much more remote from the hind margin of the vertex. Temples moderately strong, sharply margined behind. Mandibles comparatively short and broad; distinctly shorter than the great ocular diameter; with three strong teeth along their inner margin. Antennae (Fig. 224) short; their flagellum distinctly swollen, most of its joints slightly broader than long; their third joint only slightly longer than the fourth. The two terminal joints very small, partly concealed in a large and deep groove on the under side of the eleventh

¹ Compare the figure given by G. Meade Waldo, Trans. Entom. Soc. London, (1914), pt. 3-4, 1915, Pl. xci, fig. 15, ♀.

joint; the hook-like joint (Fig. 225) small, short, straight and narrow, reaching the base of the eleventh joint.

Thorax (Fig. 221) short, quadrate, only slightly longer than broad. Anterior margin of the pronotum very broad, straightly truncate, with a strong and sharp raised carina, which projects in distinct angles on the sides. The pronotum not wider at the tegulæ than on its anterior margin. Scutellum flat, broad, and long, without carinæ or teeth. Postscutellum transverse; rounded behind; without protuberances or teeth; its anterior part raised into a broadly rounded, smooth, transverse pillow; its posterior part feebly sloping. Mesonotum with deep parapsidal furrows behind. Mesopleura with a very strong, somewhat sinuate carina bordering the epinemia of the front legs; their posterior part also somewhat raised into a margin for the epinemia of the middle legs. Propodeum moderately developed; its dorsal areas meeting on the middle line behind the postscutellum so that they form a short, although very distinct, horizontal median area, which, however, is depressed into a saddle and is separated from the postscutellum by a deep and narrow furrow. Concavity of the propodeum shallow and broad, distinctly margined on its upper part by the raised superior ridges; lateral and inferior ridges and lateral



Figs. 221-225. *Odynerus rhizophorarum*, new species.

Fig. 221. Thorax from above, ♂. Fig. 222. Head in front, ♂. Fig. 223. Venation of front wing, ♂. Fig. 224. Antenna, ♂. Fig. 225. Terminal joints of antenna, ♂.

angles of the propodeum broadly rounded, the lateral angles scarcely marked. Legs normal; the hind coxæ with a sharp tooth on their upper face; the claws distinctly bifid before their apex. Wing venation: Fig. 223.

Abdomen elongate; the first segment short, with a rather vertical, abruptly rounded, anterior face; second segment about as long as broad, its sternite gradually sloping towards its base, not depressed on its middle.

Punctuation dense and coarse on head and thorax; the clypeus also covered with numerous, large, but shallow punctures; the mesopleura and dorsal areas of the propodeum very rugosely reticulate; the punctures are still strong, but more remote on the mesonotum and especially on the scutellum, which has very few punctures on its middle. Concavity of the propodeum with coarse punctures on its upper part, nearly impunctate below. Tegulæ and anterior part of the postscutellum smooth, impunctate. Punctuation of the abdomen much finer; on its dorsal face only distinct on the posterior half of the tergites; stronger and denser on the second sternite.

Black; with the under side of flagellum, tegulæ, extreme base of the abdomen, base of the apical abdominal segments, under side of the tibiae, and terminal joints of the tarsi, more or less ferruginous. The clypeus, a spot in the middle of the front and in the bottom of the emargination of the eyes, the under side of the antennal

scape, the larger part of the outer side of the mandibles, two transverse spots on the anterior margin of the pronotum forming an interrupted band, the pillow-like anterior part of the postscutellum, narrow apical margins of tergites 1 and 2 and of sternite 2, the coxæ nearly completely, and the outer side of femora and tibiæ, pale yellow. Wings subhyaline, with a dark purplish spot near their apical anterior margin.

Length (h. + th. + t. 1 + 2), 6.5 mm.

♀ unknown.

Belgian Congo.—Malela, 1 ♀, July 3, 1915 (J. Bequaert Coll.).

This species comes in the division *Stenodynerus* H. de Saussure of the subgenus *Rygdium*, and is apparently allied to *O. angustus* Saussure from Abyssinia.

Pterochilus Klug

The characters of this genus may be seen from the key, p. 27. It differs from *Odynerus* only in the remarkable structure in the female of the labial palpi, the joints of which are very elongate, flattened, and beautifully ciliated with long, recurved hairs on their inner side. This is more or less distinct in the female and always much less marked in the male; in fact, in many cases the labial palpi of the latter sex are of normal shape and not fringed. This difference between the two sexes was pointed out long ago by F. Morawitz¹; yet several authors have made use of it to introduce new generic names, such as *Pseudopterocheilus* R. C. L. Perkins² and *Hemipterocheilus* Ferton.³

In the very few species of which the males are known to me, the antennæ of that sex are shaped as in the subgenus *Odynerus, sensu stricto*, (= *Oplopus* Wesmæel, *Oplomerus* Westwood) of *Odynerus* Latreille, the five apical joints of the flagellum being curled up. In fact, it is quite possible that some of the Ethiopian species referred to *Odynerus, sensu stricto*, belong really to *Pterochilus*.

About 76 species have been described from the Palearctic, Ethiopian, Oriental, Australian, and Nearctic regions. In Africa they are almost restricted to the northern and southern subtropical parts.

The only exception to this is *Pterochilus versicolor* A. v. Schulthess, which was described from Bunkeya and Lukafu,⁴ in the southeastern Belgian Congo (Katanga). I have not seen that species. The female alone is known. In comparing v. Schulthess' description of this wasp, with that of *Odynerus*

¹ Hor. Soc. ent. Rossicæ, IV, 1866, p. 110.

² Ent. Monthly Mag., XXXVII, 1901, p. 266.

³ Ann. Soc. entom. France, LXXVIII, (1909), fasc. 3, 1910, p. 419.

⁴ Societas entomologica, XXIX, 1914, p. 78.

adonis G. Meade Waldo (p. 124), from the same region, I came to the conclusion that both are based on the same species. If this proves to be true after a comparative study of the types, A. v. Schulthess' name will have the priority.

Ethology. Very little is known in regard to the life history of *Pterochilus*, since apparently only two species have been studied in this respect. According to A. v. Schulthess,¹ the common European *P. phaleratus* (Panzer) nests in sandy soil, forming colonies. The habits of its variety *chevieranus* (Saussure) have been observed in Southern France by Ferton.² The female burrows in hard sandy or clayey soil, making a vertical gallery about one centimeter in length, which ends in a horizontal cell. A few paralyzed caterpillars are stored in this cell; and the egg hangs on a short thread from the ceiling. The adult larva spins a white, soft, and transparent cocoon before pupating. There is no chimney at the entrance to the nest. The habits of this species are very similar to those of the majority of the species of *Odynerus*. C. Horne and F. Smith³ describe the nesting habits of the Indian *P. pulchellus* Smith as follows: "This little insect builds its parallel galleries on the nearly smooth surface of whitewashed and other walls. The cells are above one another, lined with a gummy substance and fine silk (?). The clay must necessarily, from the size of the insect, be very finely worked; and the food stored consists of very minute spiders. I have reason to believe that it sometimes builds its cells on hanging straws under shelter; but the example figured was found in my veranda, built on the walls or pillars, and attached to the plaster." It seems to me that Horne's observations on this Indian wasp need verification. The nest described by Horne and Smith resembles strangely certain nests of *Pison*, stored with spiders, which I observed in the Belgian Congo.

Synagris Latreille

This genus is peculiar to the Ethiopian region, of which it is one of the most striking insect forms. The species are numerous; most of them are of large size and brilliantly colored; and, furthermore, they are of very common occurrence; their habits, also, contribute to bring them among the small number of insects which attract the attention of even the most superficial traveller.

Figure 226 shows the range of the genus: it seems to be restricted to the

¹ *Fauna Insectorum Helvetiæ. Hymenoptera. Fam. Diploptera*, 1887, p. 120.

² *Ann. Soc. entom. France*, LXXVIII, (1909), fasc. 3, 1910, pp. 419-420.

³ *Trans. Zool. Soc. London*, VII, pt. 3, 1870, p. 168, Pl. xxi, figs. 8, 8a, and 8b.

continental part of Africa; it has never been recorded from Southern Arabia nor from Sokotra, and it seems to be absent from the Malagassy subregion. There are a few records from Madagascar¹ but I doubt their correctness. The genus is very abundant, both in species and in individuals, near the equator; its importance decreases towards the tropics. In the northern part, it has been repeatedly observed near the Senegal and the Gambia, in Northern Nigeria, in Eritrea, and the Oriental Sudan (Suakim); but it

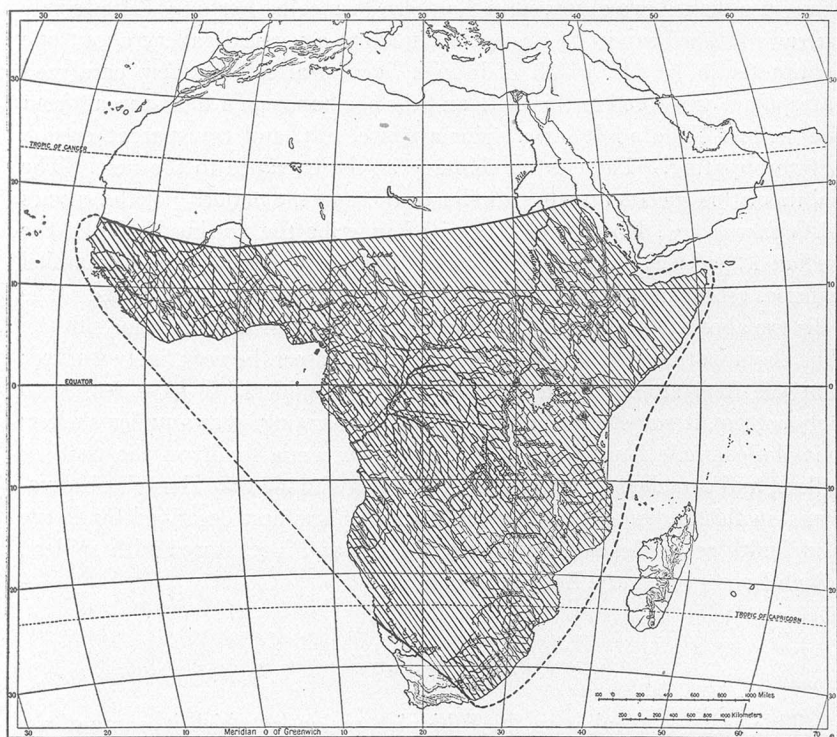


Fig. 226. Distribution of the genus *Synagris*.

seems not to have reached Egypt proper. In South Africa, it is still very common in Natal and Transvaal; there are also definite records from the Orange River Colony and the eastern Cape Colony (as far as Port Elizabeth); its most southern localities in Damaraland are Windhoek and Rehoboth, and it was not found there beyond 24° S. lat. There are, it is true, some

¹ Maill records *S. analis* Saussure and *S. abyssinica* var. *emarginata* Saussure from "Rumena Val" (Madagascar) after three females belonging to the Brussels' Museum.

specimens in various collections labelled "Cape" or "Cape of Good Hope," but this can mean any part of the Cape Colony and is not a proof of the occurrence of any *Synagris* near Cape Town or in the district of Port Nolloth. This genus has also been found on the following African coastal islands: Bissago, Fernando Po, and Zanzibar.

I have discussed at length the distribution of this genus because it offers a good illustration of a large group, typical of the African continent and restricted to the Ethiopian region of the botanists, which it covers almost exactly (compare with the map, p. 19.) I believe that, were the distribution of the different species of *Synagris* more completely known, some of them would prove to be confined either to the Savannah province or to the Western forest province of the botanists, but the available data are insufficient to reach yet definite conclusions with regard to this point.

The genus *Synagris* includes large or medium-sized insects of a typical wasp-like appearance. However, similarly shaped species are also found in *Odynerus*, especially among the forms which were formerly separated into a distinct genus *Rhyrchium*.¹ The distinction between *Synagris* and *Odynerus* is often difficult, as is proved by the fact that even experienced hymenopterists have described species of *Odynerus* as *Synagris*. The only characters on which one can rely to properly recognize a *Synagris* are found in the mouth parts and it cannot be repeated too often that an examination of the buccal organs must always precede the identification of any specimen belonging in this group.

The mouth parts of *Synagris* have been described by H. de Saussure² and recently more in detail by F. Maidl.³ Figs. 227 to 229 illustrate their structure in the type species, *S. cornuta* (Linné). All their parts are much elongate. The mentum is long and comparatively narrow; the ligula is very elongate, deeply bifid (for about its apical half), its terminal two pieces densely hairy; paraglossæ very long and slender, reaching the apical branches of the ligula; in this species there are no distinct horny spots at the apices of the branches of the ligula and of the paraglossæ. Labial palpi *three-jointed*, the joints very narrow; the basal joint much the longest; the third joint ends in a long, curved, and thickened bristle, which might be considered as a modification of a fourth joint, were it not for the fact that in other species of the genus one finds at this place two or more such bristles.⁴

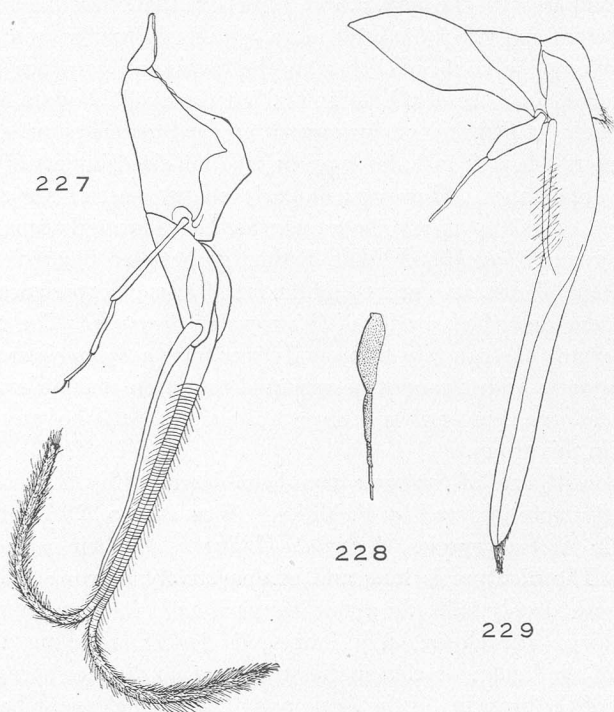
¹ I have explained before how *Ryrgchium* Spinola (= *Rhyrchium* auct.) is merely an artificial group of large-sized *Odynerus*; in this paper *Ryrgchium* is used as a subgeneric name for those species of *Odynerus* which have been known thus far as *Leionotus* (p. 121).

² Etudes fam. Vesp., I, Eum., 1852, p. 77, Pl. v, fig. 2.

³ Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 223-225.

⁴ In many species of *Odynerus*, moreover, there are one or more such strong, curved bristles at the apex of the third joint of the labial palpi, next to the true fourth palpal joint.

Maxillæ very long, sheet-like, when fully extended reaching beyond the apices of the mandibles, although the latter form a very elongate beak; the lacinia much longer than the stipes and with a dense hair brush at their apex. Maxillary palpi normally 5-jointed, although in most of the adult specimens there are only three joints left; the basal joint is very broad and flattened, the following joints are much narrower, though still distinctly flattened; they are successively shorter towards the apical one.



Figs. 227-229. Mouth parts of *Synagris cornuta* (Linné), ♀.

Fig. 227. Labium and labial palpus. Fig. 228. Maxillary palpus prepared from a pupa. Fig. 229. Maxilla and maxillary palpus.

The mouth parts of the other species of the genus are more or less differently built, but in all of them the *labial palpi* are *three-jointed* and, with a single exception, the *maxillary palpi* have *no more than five joints* (*S. vicaria* Stadelmann has 6-jointed maxillary palpi).

Until recently, there has been much discussion as to the true number of joints in the maxillary palpi of *Synagris*. It is well known that H. de

Saussure believed this number to be variable within the limits of the genus, although constant for each species; on this difference the celebrated author divided the genus into groups of subgeneric rank characterized by the maxillary palpi being either three-, four-, or five-jointed. However, he seems to have had some suspicions as to the value of this character, since he writes: "La petitesse du 4^e article chez les espèces qui en possèdent plus de 3 et l'extrême ressemblance des 3 premiers avec les 3 articles des espèces qui n'en possèdent que 3, fait que l'on se demande si le 4^e article n'est pas sujet à tomber durant la vie de l'insecte, et si la division *Antagris* ne serait pas seulement basée sur des individus mutilés, ayant perdu leur 4^e article maxillaire." The chief reason why he rejected this supposition was that in certain species, which are very distinct by other characters (such as *S. cornuta*), he was unable to find a specimen presenting more than 3 palpal joints: "J'en dois conclure que c'est bien là l'état normal de ces espèces et point un état résultant de la chute naturelle ou accidentelle d'un 4^e article."¹

Maidl² has recognized that the number of joints of the maxillary palpi affords only in a few cases reliable specific characters and, as a conclusion, he has made very important and fortunate changes in the taxonomy of the group. Not only has he united a large number of species which were merely separated on account of a difference in the number of palpal joints, reducing considerably the number of real specific forms and throwing at once a flood of light on their true affinities; but he has furthermore altered completely the subgenera of de Saussure, which were to a great extent based on differences in the number of joints of the maxillary palpi.

Before I had any knowledge of Maidl's observations, I had reached a similar conclusion by a very different method. Since it seems to me that there are still some points open to discussion, I think it worth while to record the facts on which I base my personal opinion.

Mr. Lang collected at Medje a nest of *S. cornuta* var. *flavofasciata* and had the happy idea of preserving in alcohol, together with the mother wasp, the individuals in different developmental stages found in each of the cells. Both maxillæ of the mother wasp presented three-jointed palpi. From one of the cells was removed a nearly completely developed pupa, which was fully colored, the yellow transverse band on the first tergite, characteristic of the variety, being just as conspicuous on the black abdomen as in the adult specimens. However, the wings, legs, and mouth parts were still enclosed in their nymphal sheets. I carefully removed the sheets of the maxillary palpi and discovered that in this stage these organs are distinctly

¹ Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 174.

² Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 223.

five-jointed (Fig. 228); this was visible on both maxillæ. Furthermore, only the three basal joints were brownish and chitinized, the two apical ones being whitish and soft. In another vial in which Mr. Lang had preserved the contents of another nest together with the mother wasp, I found a completely developed female ready to emerge: its right maxilla showed five-jointed palpi, whereas only three joints were visible on the left side. In this case, the maxillary palpi of the mother wasp were three-jointed on one side and only two-jointed¹ on the other. This result brought me to look over carefully the mouth parts of a large set of *S. cornuta* (130 specimens belonging to the typical form and to the different varieties), but I have found three-jointed maxillary palpi in all the specimens, except in one female where they were five-jointed on both sides; this specimen belonged to the typical *S. cornuta* and was caught with numerous others (with three-jointed palpi) from a large colony; it must be added that it was preserved in alcohol. Thus, *S. cornuta* possesses five-jointed maxillary palpi, but as a rule the two apical joints are dropped either together with the nymphal sheets or shortly after the insect emerges.

Similar observations on other species are much needed, but they will prove, I believe, that in all species of *Synagris* (with the exception of *S. vicaria* Stadelmann) the normal number of joints in the maxillary palpi is *five*, there being only a difference in the number which happens to be retained by the emerged adult. F. Maidl still believes that certain species have normally 4-jointed maxillary palpi, though he admits that it is difficult to decide whether one of the joints dropped off or not. I think that the examination of the pupæ of various species will easily solve the problem. So much is sure: the number of joints of the maxillary palpi can no longer be used to separate the species.

Very little is apparently known as to the function of the palpi in the Hymenoptera, but from the state of affairs observed in *Synagris* we may reasonably infer that in this genus their function can not be very important. The number and the shape of the palpal joints have been extensively used throughout the order as generic characters, but I believe that in many cases their importance has been over-estimated.

Numerous *Synagris* have been described as distinct species, as is amply proved by the long list of synonyms in the second part of this paper; several species were also wrongly included in the genus. All this made the identification of these interesting wasps extremely difficult. It is therefore very gratifying that Maidl has recently published a Monograph of the genus,¹

¹ Monographie der Gattung *Synagris* Latreille. Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 215-333, Pls. I-V. I am much indebted to Mr. J. C. Nielsen of Copenhagen, for procuring for me, under the present difficult circumstances, a copy of Maidl's paper.

which, as a whole, proves to be a valuable revision of the group. My own conclusions were largely reached before I had an opportunity of seeing a copy of Maidl's paper; but, as a rule, they agree with this author's views.

Maidl has given very complete information with regard to the characters which may be used to separate the species; he has plainly shown the great individual variability not only of the color pattern, but also of many morphological characters of the males, which have frequently been believed to be of specific value.

The sculpture of the propodeum is, in my opinion, one of the most useful characters of the genus, because it is similar in both sexes of the same species. It seems to me that Maidl has not laid enough stress on this peculiarity, although he describes the sculpture accurately for each species. The concavity of the propodeum is always transversely striate, but the striæ are stronger in certain species than in others. In some species, however, (such as *S. spiniventris* [Illiger] and *S. calida* [Linné]) the striation continues on the sides in the upper part, covering the entire dorsal lateral areas with conspicuous, regularly parallel, transverse wrinkles; whereas in others (such as *S. abyssinica* Guérin), the striation is indistinct on these dorsal areas and gradually becomes a system of irregularly reticulate ridges, the surface having a granulose appearance.

Ethology. No other genus of solitary wasps offers such an amount of interesting ethological problems. Some of the species are still true to the primitive habit of the Eumeninæ, hurriedly accumulating a provision of caterpillars above the egg, then walling the orifice of the cell, and taking no further care of their offspring. In other species, however, the maternal instinct is much more perfect; the female nurses her young from day to day, with caterpillars ground up into a paste; this is evidently a transition towards the feeding habits of the true social wasps. Intermediate conditions between these two extremes are also found.

The habits of the following species of *Synagris* have been studied more or less completely: *S. calida* (Linné), *S. clypeata* Mocsáry, *S. cornuta* (Linné) and its varieties, *S. mirabilis* Guérin, and *S. spiniventris* (Illiger); most of these observations are recorded below under the named species.

S. mirabilis Guérin was observed by Gueinzus in Natal. The mud nest described by Smith¹ was much smaller than that of *S. calida* and probably in an unfinished state; it contained only two cells.

In the second part of this paper I have listed 24 forms of *Synagris* which I believe to be distinct species, characterized by constant structural peculiarities. Of these, 11 are represented in the collection made by the Congo

¹ F. Smith, Trans. Entom. Soc. London, (2), III, 1856, p. 128.

Expedition. I have not seen specimens of the following species, which have also been recorded from the Belgian Congo:¹

S. aterrima Maidl.—Northeastern Belgian Congo (Moera, near Beni, type locality).²

S. negusi R. du Buysson.—Northwest of Lake Tanganyika.³

S. ornatissima Maidl.—Northeastern Belgian Congo (Mawambi, type locality).⁴

S. proserpina Gribodo var. *nyassæ* (Stadelmann).—Southeastern Belgian Congo (Lufra River, Katanga).⁵

S. similis Maidl and its var. *maculata* Maidl.—Northeastern Belgian Congo (Beni and Moera, type localities).⁶

S. vicaria Stadelmann.—Southeastern Belgian Congo (Lofoi, Katanga).⁷

The 18 species which are thus known to occur within the boundaries of the Belgian Congo can be separated by the following keys. These keys are only in part based on the one proposed in Maidl's Monograph, since I found it useful to include in them more of the structural characters of the species.

Key to the Subgenera of *Synagris*

1. ♀. Clypeus piriform, with two conspicuous longitudinal carinæ on its apical two-thirds. Mandibles comparatively short, strongly grooved and carinate on their external face, their inner margin only with three feeble notches. Postscutellum feebly raised, not gibbose. Propodeum without strong lateral spines, its lateral and inferior ridges irregularly denticulate. ♂ unknown.

Pseudagris.

♀ ♂. Clypeus without carinæ or with a feeble indication of two very short ridges near its apex. 2.

2. Maxillary palpi 6-jointed; labial palpi 3-jointed, but the joints very long and heavily built. Vertex without hairy fovea. Mandibles and postscutellum as in *Pseudagris*. Propodeum without strong lateral spines, not denticulate. In the ♂ the terminal joint of the antennæ is very short, hardly curved, and cannot be folded as a hook beneath the apex of the flagellum. *Rhynchagris*.
Maxillary palpi never more than 5-jointed; labial palpi slender. Postscutellum bidentate or with two gibbosities. Propodeum as a rule with lateral acute protuberances. Terminal joint of the antennæ ♂, elongate, more or less curved, folded as a hook beneath the apex of the flagellum. 3.

3. Mandibles with more or less distinct grooves and carinæ on their external face, their inner margin in the ♀ with three notches; in the ♂ with teeth of variable

¹ According to personal observations made during 1912, *S. mirabilis* Guérin exists in the southeastern Belgian Congo (Katanga); but the specimens were not studied in preparing this paper.

² F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 247.

³ F. Maidl, *op. cit.*, p. 273.

⁴ F. Maidl, *op. cit.*, p. 298.

⁵ G. Meade Waldo, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 454 (*S. flavomaculata* G. Meade Waldo).

⁶ F. Maidl, *op. cit.*, p. 309.

⁷ F. Maidl, *op. cit.*, p. 251.

size and shape, very rarely (*S. negusi*) with protuberances near their base. Postscutellum with lateral, somewhat spiny tubercles. *Paragris*. Mandibles almost smooth on their external face, their inner margin in both sexes finely serrulate; in the ♂ often with protuberances or horns near their base. Postscutellum with two gibbosities (not bispinose). . . . *Synagris, sensu stricto*.

These four subgenera are well-defined, natural groups, much better defined, indeed, than many of the "genera" which have been proposed in recent years among the *Vespidæ*.

Subgenus **Synagris**, *sensu stricto*

Maidl accepts four species in this subgenus: *S. cornuta* (Linné), *S. similis* Maidl, *S. proserpina* Gribodo, and *S. fulva* Mocsáry. All of these are very variable as regards color, so that it is important to know their true morphological characters.

S. fulva Mocsáry has not been found hitherto in the Belgian Congo; it is chiefly characterized in the male by the existence of a protuberance (of the shape of a spine or horn) on the base of the clypeus. The structural differences between the three other species are exceedingly feeble, at least according to Maidl's descriptions. They are compared in the following table:

<i>cornuta</i>	<i>proserpina</i>	<i>similis</i>
♀ ♀	♀ ♀	♀ ♀
Second abdominal sternite gradually sloping from the middle of its length towards its base.	Second abdominal sternite more suddenly sloping on its basal third.	Apparently like <i>S. cornuta</i> , the differences given have hardly any value.
	Tubercles of the postscutellum as a rule more prominent than in <i>S. cornuta</i> .	
♂ ♂	♂ ♂	♂ ♂
Second abdominal sternite gradually sloping from the middle of its length towards its base.	Second abdominal sternite more suddenly sloping on its basal third.	Second abdominal sternite and denticulation of the mandibles as in <i>S. cornuta</i> .
Apical margin of the clypeus narrowly or broadly rounded, or nearly truncate.	Apical margin of the clypeus distinctly truncate or more or less emarginate.	Apical margin of the clypeus distinctly emarginate.
Denticulation of the inner margin of the mandibles only slightly stronger at their base than at their apex.	Denticulation of the inner margin of the mandibles stronger than in <i>S. cornuta</i> , especially towards their base.	

I have not seen *S. proserpina* and it is possible that this is a distinct species. In the typical form (which has not been found in the Belgian Congo) the head, thorax, and base of the abdomen are entirely, or nearly entirely, brownish-red; the rest of the abdomen is black, with interrupted white bands on the apical margin of tergites 3 to 5.

The var. *nyassæ* (Stadelmann) has been recorded from the Katanga (Lufira River)¹; it differs from the typical form in the extension of the black color on head, thorax, and base of the abdomen; the white bands on the terminal tergites are broadly interrupted on the middle line, so as to form lateral spots. Total length: ♀, 20 to 25 mm.; ♂, 25 to 30 mm.

Synagris similis Maidl and its variety *maculata* Maidl were described from 4 ♀♀ and 3 ♂♂ from the northeastern Congo Forest (Beni and Moera).² I do not believe that the structural characters given by the author are of any value in this group. I have seen several specimens of a *Synagris* collected near Beni (Lesse and vicinity), which are colored exactly like Maidl's *S. similis*, but I cannot discover any difference in the structure of either sex between them and *S. cornuta* (Linné). These specimens are described below as *S. cornuta* var. *similis*, new variety (p. 210).

S. similis Maidl is described as being almost entirely black, with the clypeus, mouth parts, antennæ, and legs more or less brownish-red. The var. *maculata* Maidl differs only in having two more or less extended, lateral, whitish-yellow spots on the second abdominal tergite. Total length: ♀, 20 to 24 mm.; ♂, 23 to 24 mm.

***Synagris cornuta* (Linné)**

This species is one of the most common wasps throughout Equatorial Africa. Its coloration is very variable, but it can always be recognized by the following structural characters.

Mandibles straight, styletiform, long and very sharp; their inner, straight margin finely serrulate. Postscutellum raised on each side of the middle line in a broad, low, and bluntly rounded tubercle. Lateral angles of the propodeum strongly projecting as sharp teeth. Clypeus separated in both sexes from the inner margin of the eyes by distinct cheeks; in the ♀, the clypeus about as broad as long, with a rounded or even pointed, blunt apex; in the ♂, the shape of the clypeus is somewhat variable owing to differences in the development of the basal mandibular horns; very often it is distinctly broader than long and its apical margin is truncate and rounded.

Length (h. + th. + t. 1 + 2): ♀, 14 to 21 mm.; ♂, 18 to 28 mm. The size of the male is very variable, but as a rule this sex is larger than the female.

¹ G. Meade Waldo, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 454.

² F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 309.

Among the characteristics of this species are the horn-like excrescences at the base of the mandibles in the male; both size and shape of these horns are very variable. In a specimen from Malela, these horns are 15 mm. long, i. e., scarcely shorter than head and thorax together; in this case, they are strongly curved inwardly and ventrally so as to cross each other on their apical third; about their middle they present on their dorsal face a strongly projecting tubercle, and a similar but slighter swelling near their base. In other specimens in which the horns are shorter, these median and basal tubercles disappear; one may find a complete series of transitions between such specimens with very long horns and individuals which may be called unarmed, since they present on the base of the mandibles only a broadly rounded tubercle. There is, apparently, some correlation between the size of the body and the length of the horn-like appendages, the largest males having as a rule the longest horns; furthermore, a correlation of a similar nature seems to exist between the length of the horns and the size of the head. The material at hand is not extensive enough to permit a statistical evaluation of the frequency of different developmental stages of these horns. In this species the male always has a distinct longitudinal groove on the vertex, and its second abdominal sternite is always unarmed.

An excellent specific character, which has apparently been overlooked, is the shape of the tarsal claws of both sexes; they are not only bifid at their apex, but between the preapical tooth and their base, their inferior margin is distinctly produced in a broad, triangular, accessory tooth, which I was unable to find in any other species of *Synagris* (Fig. 231). It will be interesting to inquire whether *S. proserpina* also possesses this accessory tooth.

I have given, in Fig. 232, an outline drawing of the male genitalia of *S. cornuta* as seen from above, merely to call attention to these organs, which may perhaps furnish reliable specific characters. It is very unfortunate that hymenopterists have so far failed to reach an understanding with regard to the nomenclature of the male genitalia. I would have liked to use Franklin's names, as explained in his paper on American Bombidæ¹; but I found this impossible, partly because the homology of the different parts of the genitalia in the bees and wasps is not yet clear. In the absence of anything better, I have followed E. Zander,² who has given a comparative table of the different names used for the same parts by previous authors.

230



231



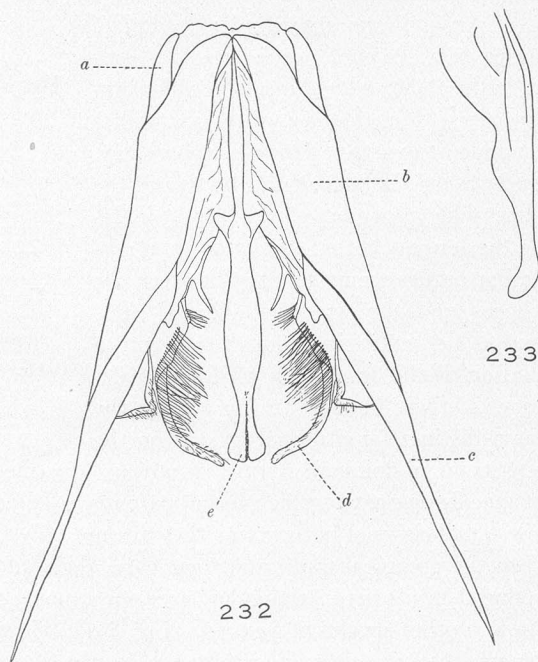
Fig. 230. *Synagris abyssinica* Saussure, tarsal claw, ♀.

Fig. 231. *Synagris cornuta* (Linné), tarsal claw, ♀.

¹ Trans. Amer. Ent. Soc., XXXVIII, 1913, pp. 223-225.

² E. Zander, Beiträge zur Morphologie der männlichen Geschlechtsanhänge der Hymenopteren. Zeitschr. f. wiss. Zool. Leipzig, LXVII, 1900, pp. 461-489, Pl. xxvii.

The *cardo* (*a*) is a large dorsal, basal sclerite which provides most of the attachment for the genitalia to the rest of the abdomen; in *Synagris* it is distinctly subdivided, being only chitinous on its sides. On the *cardo* are inserted two lateral organs which may be known as the *claspers*, although they consist each of two fundamentally distinct parts: the *valvæ*. The *valva externa* (*b*) corresponds to Franklin's *branch* or *stipes*; it is comparatively short in this genus. The *valva interna* (*c* and *d*) is subdivided into



Figs. 232-233. *Synagris cornuta* (Linné).

Fig. 232. Genitalia, ♂, from above: *a*, cardo; *b*, valva externa; *c* and *d*, valva interna; *e*, squama; *d*, volsella; *e*, penis. Fig. 233. Penis, ♂, in profile.

a number of differently shaped pieces; the two most apparent of them are: an elongate and narrow, sharply pointed, chitinous, external piece, which may possibly correspond to Franklin's *squama* (*c*); and a membranous internal, hairy lobe, which may be Franklin's *volsella* (*d*). The valva interna has been called, in *Vespa germanica* by Kluge,¹ *sagitta*, a name which has

¹ M. Kluge, Das männliche Geschlechtsorgan von *Vespa germanica*. Arch. f. Naturgesch., LXI, 1, 1895, pp. 159-198, Pl. x.

been applied in *Bombus* to an entirely different organ. The shape of the *valva externa* is apparently the same in all species of *Synagris*, whereas the *valva interna* seems to afford good specific characters. Between the claspers we find on the middle line an unpaired organ, which is called by Zander the *penis* (*e*); in *Synagris* it is only very feebly divided at its apex. It corresponds to the *sagittæ* + *uncus* + *penis* of Franklin and to the *spatha* of Kluge. Its shape may also be used for systematic purposes.

The geographical distribution of *S. cornuta* (Linné) and its numerous color forms is very instructive: as known at the present time, it covers almost exactly Engler's Western Forest Province, the species being most abundant in the Rain Forest (compare with the map, p. 19); it extends from Sierra Leone, the Gold Coast, and Togo, throughout Cameroon, Spanish Guinea, the French Congo, the Portuguese Congo (Landana), and the Belgian Congo, as far east as Uganda and the eastern shores of Lake Victoria Nyanza. It seems not to exist in Angola proper nor in the south-eastern Belgian Congo (Upper Katanga); in the latter region it is apparently replaced by the East African *S. proserpina* Gribodo.

Key to the Color Varieties of *S. cornuta* (Linné)

1. Abdomen entirely black or with the basal part of the first segment ferruginous-red. No yellow or yellowish-white markings on the second segment. 2.
Second abdominal tergite with yellow or yellowish-white spots or bands. 5.
2. The insect nearly entirely black; only the antennæ, clypeus, mandibles (with their horns in the ♂), and legs more or less ferruginous.
var. *similis*, new variety.
The ferruginous color much more extended, invading the thorax also. 3.
3. Head, thorax, legs, and base of the first abdominal segment entirely or nearly entirely ferruginous-red. var. *rufithorax*, new variety.
The vertex and at least a median mark on the mesonotum black. 4.
4. Mesonotum entirely or nearly entirely black, this color also extending over the upper part of the temples. typical *S. cornuta* (Linné).
Mesonotum only with a broad, elongate, median, black mark; the black on the head restricted to the vertex. var. *ituriensis*, new variety.
5. Thorax entirely, legs and head for the greater part, black. 6.
Head, thorax, and legs for the greater part ferruginous-red; the vertex and mesonotum black. 7.
6. Second abdominal tergite with two lateral, whitish-yellow spots.
var. *maculata*, new variety.
Second abdominal tergite with a continuous, transverse, whitish-yellow band.
var. *flavofasciata*, new variety.

7. Second abdominal tergite with two lateral, whitish-yellow spots.

var. *didieri* (R. du Buysson).

Second abdominal tergite with a continuous, transverse, whitish-yellow band.

var. *basalis* (Mocsáry).

As these different color varieties are shown on Plate II, it will be easy to recognize them. It must, however, be remembered that they are connected by intermediate color variations; and, since they occur together in the same region and often in the same colony of nests, they cannot be considered as subspecies or geographical races.

68. **Synagris cornuta** (Linné), typical form

Plate II, Figure 2

The typical form is the color variation originally described by Linné as *Vespa cornuta*. In this the abdomen is entirely black; head, thorax, and legs are for the most part ferruginous-red; the vertex, black; the mandibles, yellow; the mesonotum, black. Wings, very dark brown or black, with purple effulgence. I have not seen the quite typical coloration; what comes next to it among the Congo material are numerous specimens of both sexes which may be called subtypical; they agree with the typical form except for the ferruginous-red basal part of the first abdominal segment. This red base may be more or less extended, and may cover the whole of the sternite, but I have seen no specimens with entirely rufous first tergite. Very often also the pleura are more or less black. This color variation is apparently the most common form, at least in the West African subregion; it is the var. *a* of H. de Saussure¹ or var. 2 of Schletterer.² It is hardly worth while to give it a name as it comes so close to the typical form.

Belgian Congo.—Very common: 33 ♀♀ and 18 ♂♂ from Malela, Basoko, Stanleyville, Bengamisa, Bafwasende, between Panga and Banalia, Avakubi, Poko, Akenge, Walikale, and Lubutu.

69. **Synagris cornuta** var. **rufithorax**, new variety

Plate II, Figure 1

♀.—Coloration nearly as in the typical form, but the thorax entirely ferruginous-red; the vertex with only a small black spot around the ocelli; the first abdominal segment broadly ferruginous-red on its base. This is the var. *b* of H. de Saussure¹ or var. 1 of Schletterer.²

Belgian Congo.—Malela, 2 ♀♀, July 1915 (Lang and Chapin Coll.).

¹ Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 180.

² Ann. Soc. ent. Belgique, XXXV, 1891, p. 20.

70. ***Synagris cornuta* var. *ituriensis***, new variety

Plate II, Figure 3

♀ and ♂.—Coloration intermediate between the typical form and the var. *rufithorax*. Head, thorax, and legs ferruginous-red, except for the vertex, which is entirely black, and a black, elongate, median spot on the mesonotum; this black spot starts on the anterior margin, where it is broadest, and its extremity is regularly rounded and situated a short distance from the posterior margin of the mesonotum. Mesosternum partly black. Abdomen black; the basal half of the first tergite and the first sternite entirely, ferruginous-red. In one of the specimens the black mark of the mesonotum is much reduced.

Belgian Congo.—I have seen 13 ♀ ♀ belonging to this color variation, which were collected from a colony in a house, at Risimu (Batama, near Bafwaboli), September 1909; one of these females is the holotype. In other nests of the same colony were collected females of the subtypical form of *S. cornuta* (Linné) with the mesonotum entirely black. This variety exists also at Stanleyville, together with the subtypical form: 1 ♀ and 2 ♂ ♂, April 1915, one of these males being the allotype.

71. ***Synagris cornuta* var. *basalis*** (Mocsáry)

Plate II, Figure 5

This remarkable variety has the same coloration as the typical form, except for a broad, pale yellow fascia on the base of the second tergite; the first segment may be rufous on its extreme base or entirely black.

Belgian Congo.—Apparently not rare in its northeastern part. Messrs. Lang and Chapin collected 26 ♀ ♀ and 2 ♂ ♂ at Niangara, Medje, and Poko; and a fine male of this variety was taken at Yakuluku by my friend Dr. Rodhain.

72. ***Synagris cornuta* var. *didieri*** (R. du Buysson)

Plate II, Figure 4

Belgian Congo.—Poko, 2 ♀ ♀, taken together with the preceding variety from the same colony. This is the var. 3 described by Schletterer from the Belgian Congo (Equateur).¹

¹ Ann. Soc. ent. Belgique. XXXV, 1891, p. 20.

73. *Synagris cornuta* var. *flavofasciata*, new variety

Plate II, Figure 7

♀ and ♂.—Similar to the var. *basalis*, but head and thorax are nearly entirely black; the ferruginous-red color is restricted to more or less extended portions of the antennæ, mandibles (together with the horns in the ♂), clypeus, and legs, and sometimes also of the sides of scutellum and postscutellum; the base of the abdomen is black. The yellow fascia on tergite 2 is very broad; in one of my specimens it covers nearly the whole surface, only a broad posterior median triangle, connected with a narrow apical band, remaining black.

Belgian Congo.—I have seen 3 ♀ ♀ and 2 ♂ ♂ of this form from Medje (one of the females is the holotype, one of the males the allotype) and 1 ♀ from Bafwabaka (Lang and Chapin Coll.). I collected a fine pair at Kambi na Mambuti (between Penge and Irumu, March 1914), where the female was building its clay nest under the roof of the rest house.

74. *Synagris cornuta* var. *similis*, new variety

Plate II, Figure 8

♀ and ♂.—This form is apparently related to the preceding, from which it differs only by the absence of the yellow transverse fascia on the second tergite; the abdomen is entirely black; head, thorax, and legs are as in the var. *flavofasciata*.

Belgian Congo.—This variety is common in some localities of the north-eastern Congo Forest. Three ♂ ♂ and 1 ♀, in the collection of the Congo Expedition from Medje, January 1914, belong to it; the female is the holotype, and one of the males the allotype. I found it to be the only form of the species in the Semliki Forest (Lesse and villages of the vicinity; 9 ♀ ♀ and 1 ♂, June and July 1914).

I have explained before why I believe that this color form of *S. cornuta* might prove to be the same insect as Maidl's species *S. similis*.

75. *Synagris cornuta* var. *maculata*, new variety

Plate II, Figure 6

♀.—Intermediate as regards coloration between the var. *similis* and the var. *flavofasciata*; black and ferruginous-red as in the var. *flavofasciata*; the second abdominal tergite with two lateral whitish spots.

Belgian Congo.—Medje, 1 ♀, July 22, 1910 (Lang and Chapin Coll.).

This color form is probably the same insect as *S. similis* var. *maculata* Maidl.

Ethology. Ed. André,¹ in 1895, described briefly the nest of *S. cornuta* (Linné), and R. du Buysson, in 1908, that of *S. cornuta* var. *didieri* (R. du Buysson).² However, we are indebted to E. Roubaud³ for the first extensive account of the life history of this remarkable wasp.

Synagris cornuta builds a mud nest very similar to that of other species of this genus. In conformity with the size of the wasp, the nest may be rather large; but its cells are never very numerous, their average number being six. The small number of cells is the result of the aberrant behavior of this species; for *S. cornuta* feeds a single larva from day to day with caterpillars ground up into a paste which it brings to the mouth of its offspring in the same manner as do social wasps. Under ordinary conditions, about one month is required by the mother wasp to rear her young from the laying of the egg to the closing of the cell above the full-grown larva; only after the orifice of this one cell is closed, does the female resume her original work of mason and build at the side of the closed cell a new one of the same type. The males do not participate in the construction or protection of the nest, nor in the rearing of the young; yet they are not entirely indifferent to the work of the females; they know all the nests that might be found in a given area and visit them regularly, doubtless for the purpose of seizing virgin females as soon as they emerge. The horn-like appendages of the mandibles of the males may play some rôle in copulation, as suggested by Lepeletier de St. Fargeau.⁴ Roubaud once observed that two males, who met on the same nest, repelled each other with their large pincers. The big Ichneumon wasp, *Osprynchotus violator* (Thunberg),⁵ and a beetle of the family Rhipiphoridae are known to parasitize the larvæ of this *Synagris*.

Mr. H. Lang has made some observations on the habits of this wasp; they are valuable in as much as they show that the different color varieties which were described above do not differ in their behavior from the typical form studied by Roubaud.

A large colony of the subtypical form of *S. cornuta* (Linné) was photographed by Mr. Lang at Bengamisa, September 27, 1914. Several hundred mud nests were built close together inside a house, on the under side of the

¹ Revue d'Entom., Caen, XIV, 1895, p. 352. Many years before H. Lucas, Ann. Soc. entom. France, (5), VII, 1877, Bull. entom., p. clvi, described a black nest of resinous material, collected at Bagamoyo (east coast of Africa), which he attributed to a species of the genus *Synagris*. It is very doubtful whether this wasp was *S. cornuta*, since that species is not recorded from East Africa; furthermore, *S. cornuta* builds ordinary mud nests, without any addition of resinous material.

² Revue d'Entom., Caen, XXVII, 1908, p. 215 (nest collected near Irebu by L. Didier).

³ C. R. Ac. Sc. Paris, CXLVII, 1908, p. 696; Ann. Soc. ent. France, LXXIX, 1910, pp. 7-16. A translation of these important observations may be found in the Annual report of the Smithsonian Institution for 1910; 1911, pp. 513-521.

⁴ Hist. nat. Ins. Hym., II, 1841, p. 592.

⁵ = *Osprynchotus flavipes* Brullé, *O. heros* Schetterer, etc. See W. A. Schulz, Zool. Annal. Würzburg, IV, 1-2, 1911, pp. 35-37; Berliner entom. Zeitschr., LVII, 1912, pp. 63-64.

ceiling which was thatched with the leaf-stalks of a *Raphia* Palm. Some of these nests (Plate III) show very distinctly the short neck with its slightly widened opening, curved to the side and downwards; such a chimney is built at the entrance of the cells containing eggs or larvæ still nursed by a female. This necked entrance must not be confused with the numerous openings seen on some of the mud lumps and which were made by emerging adults. Two or even three such bent necks may occasionally be found on a single mud lump, which proves that several females may become very closely associated in such colonies. Such associations of females are similar to those described by A. Ducke for *Zethus lobulatus* Saussure, a South American solitary wasp which also feeds a single larva from day to day with caterpillars.¹ Mr. Lang caught a female of *Osprynchotus violator* (Thunberg) flying around the nests of this colony.

Another nest collected with its occupants at Medje, July 17, 1910, has been referred to before (p. 199). It was fixed on a stick underneath the thatched roof of a building and was built of pale brownish clay and white kaolin, the latter material forming the external cover of the nest. The kaolin was collected by the mother wasp from the walls of the houses, which in the Congo are often whitewashed with this substance. Regarding this, Mr. Lang remarks in his field notes: "The whitish clay on the houses is a rather powdery sort of material. But, as was observed repeatedly, these wasps go down to the brook, a distance of about 250 yards, to suck moisture from the sand at the edge of the water; then they come to the walls of the house, break off the kaolin with their mandibles, mix it with their supply of moisture and with saliva, rolling it between the front legs and kneading it with the mandibles. The resulting lump of mortar, 4 to 5 mm. in diameter, is held between the front legs as they fly off to the nest. The finished structure is remarkably strong and tough." This nest consisted of six cells, five of which were closed; the mother wasp was found sitting in the sixth cell, which was open and contained an egg. The closed cells contained respectively: a nearly adult pupa, already fully colored; a still uncolored pupa; a large full-sized larva; a smaller full-grown larva; and an adult parasite (*Osprynchotus violator*) inside a pale yellow cocoon. This *Osprynchotus* cocoon is membranaceous, translucent, and smooth on its inner side; it is connected with the mud wall of the cell by means of a few silky threads. In the cells which contained pupæ and larvæ of *Synagris* no debris of the larval food could be discovered, which is in agreement with the peculiar nursing habits of this species. But in the parasitized cell I found, outside of the silky cocoon containing the Ichneumon wasp, the remains of a *Synagris*

¹ Zool. Jahrb. Abt. f. Syst., XXXVI, 1914, p. 325 (see p. 32).

pupa, where parts of the legs, antennæ, and head with ocelli could be easily recognized. This proves that the parasite might have infected the cell only after the full-grown larva had changed into the pupal stage; or, what is more likely, the larva became infected in an earlier stage, when it was still nursed by its mother, but the infection did not prevent its transformation into a pupa. In a recent paper, Roubaud states that, in a parasitized cell of *Synagris cornuta*, the *Osprynchotus* larva, after having devoured the wasp larva, must be fed with ground up prey from day to day by the mother wasp till it is full-grown; the intruder thus usurping entirely the place and rights of the legitimate offspring.¹ But the presence in a closed cell of remains of a *Synagris* pupa together with an *Osprynchotus* pupa, clearly shows that this process is not indispensable. The inhabitants of this nest belong to the var. *flavofasciata*. Other nests of this variety were collected in the same locality. Mr. Lang remarks that the neck at the entrance of the open cell may sometimes be long enough to be compared to a funnel. One of the nests was recently started; it consisted of a single cell in which the mother wasp was found feeding on a piece of caterpillar.

The photograph, Plate IV, Fig. 1, shows a mother wasp of the var. *flavofasciata* sitting outside her nest, which was, as in the preceding cases, fixed on a stick beneath a roof. This nest is shown natural size; it is a lump nearly entirely built of the white kaolin collected on house walls in the manner referred to above. Its four cells were somewhat irregularly united; the open cell did not contain either an egg or a larva, but the mother wasp was usually sitting in it, her head directed outward. She was observed in this position for two days. The orifice of this empty cell is also slightly curved downward in a short neck. The other cells contained respectively a fully developed female ready to emerge, a still uncolored pupa, and a full-grown larva. The adult female which was enclosed in the nest showed only small, lateral, pale spots on the second abdominal tergite, whereas the mother wasp was adorned with a continuous broad, transverse, ivory-white fascia.

Mr. Lang also describes in his field notes a colony of the subtypical form at Risimu (Batama), September 7, 1909. In this case, some thirty nests were spread over a length of 6 feet on the under side of a stick supporting a roof.

Mr. J. Chapin describes a nest of the same subtypical *S. cornuta* located on the under side of a *Borassus* leaf (Leopoldville, July 11, 1909); this nest was a roughly oblong mud lump containing 5 cells, two of which were empty

¹ Ann. Sc. nat. Zool., (10), I, 1, 1916, p. 15, footnote. In his previous paper on the ethology of *Synagris cornuta*, Roubaud does not draw this conclusion: he merely explains how parasitism by *Osprynchotus* may lengthen the rearing period of the wasp larva (Ann. Soc. entom. France, LXXIX, 1910, p. 14).

(left by the adults) and two contained pupæ; in the fifth was found a young larva and in this cell the mother wasp was accustomed to sit with her head at the entrance. Another wasp with larger mandibles (a male) sometimes came to the outside of the nest.

Subgenus **Paragris** H. de Saussure

Key to the Congo Species

Females

1. Clypeus entirely or nearly entirely covered with minute, more or less distinct, confluent longitudinal striæ.....2.
Clypeus never extensively covered with longitudinal striation, its surface often smooth or with scattered punctures. Vertex always with a hairy fovea. .6.
2. Second abdominal sternite with two strong and sharp longitudinal carinæ near its base. Concavity of the propodeum almost without sculpture, its dorsal areas densely and coarsely, rugosely reticulate; its lateral angles projecting as feeble spines; the inferior ridge between this spine and the insertion of the abdomen compressed into a broad, somewhat discolored lamella. Vertex with a hairy fovea. Length (h. + th. + t. 1 + 2), 16 mm.
S. rufopicta Tullgren.
Second abdominal sternite without longitudinal carinæ. Lateral angles of the propodeum forming distinct spiny protuberances, the inferior ridge not flattened into a lamella.....3.
3. Vertex without hairy fovea. Punctuation on head, thorax, and abdomen, faintly marked. Concavity of the propodeum smooth, its dorsal areas with irregular transverse striæ. Clypeus shaped as in *S. huberti*. Black, with brownish-red spots on head, thorax, and base of the abdomen; the antennæ and legs also brownish-red; the mesonotum black (these two colors distributed much as in typical *S. cornuta*); abdomen with 6 pairs of whitish-yellow spots, one pair on tergites 1, 3, 4, and 5 and two pairs on tergite 2. Total length, 18 mm. This species has been described from the forest region of the northeastern Belgian Congo (after Maidl).....*S. ornatissima* Maidl.
Vertex with a distinct hairy fovea. Punctuation distinct, especially on the head. Sculpture of the propodeum different.....4.
4. Clypeus elongate and piriform; its wide apex broadly rounded at the edges; the striation of its surface only feebly marked. Transverse striation of the concavity of the propodeum strong, extending over the whole of its dorsal areas; its lateral spines well developed. Second abdominal sternite feebly raised on its middle towards its base. Pubescence of the thorax ochre-yellow and somewhat velvety.¹ Length (h. + th. + t. 1 + 2), 20 to 24 mm.
S. æstuans Saussure.

¹ Only visible on fresh or perfectly preserved specimens.

- Clypeus shorter piriform; its apex comparatively narrow, straightly truncate or feebly sinuate, often with sharp, subcarinate edges. Dorsal areas of the propodeum rugosely reticulate, without distinct transverse striæ.....5.
5. Larger species; length (h. + th. + t. 1 + 2), 18 to 23 mm. Second abdominal sternite feebly convex towards its base; not projecting more on its middle than on its sides; its median line slightly depressed; in front of its hind margin there are two transverse (often inconspicuous) ridges. Transverse striation on the concavity of the propodeum very distinct.
S. abyssinica Guérin.
- Smaller species; length (h. + th. + t. 1 + 2), 16 mm. Second abdominal sternite gradually flattened towards its base, without depressed median line and without transverse preapical ridges. Striation on the concavity of the propodeum very feeble.....*S. huberti* Saussure.
6. Clypeus broadly piriform; with broadly truncate and somewhat rounded apical margin; its surface distinctly flattened, depressed, or slightly excavated over its apical fourth.....7.
- Clypeus more or less piriform; convexly swollen throughout or very narrowly flattened into a preapical margin. Striation of the concavity of the propodeum always extending over its dorsal areas. Basal part of the second abdominal sternite more or less distinctly raised on its middle, where it projects more than on its sides, markedly depressed behind this median raised part.....9.
7. Hind tarsi much broadened and comparatively short; their third joint about as long as broad at its apex. Apical part of the clypeus only flattened, not excavated. Second abdominal sternite uniformly convex; gradually sloping towards its base; not projecting more on its middle than on its sides. Striation of the dorsal areas of the propodeum irregular, more or less reticulate. Length (h. + th. + t. 1 + 2), 24 mm.....*S. crassipes* Kohl.
- Hind tarsi normal, slender, their third joint distinctly longer than broad at its apex. Striation of the propodeum distinct and regular on its dorsal areas as well as in its concavity.....8.
8. Basal part of the second abdominal sternite slightly, although distinctly flattened behind this median raised part. Clypeus as a rule distinctly depressed or more or less excavated on its apical quarter. Length (h. + th. + t. 1 + 2), 18 to 23 mm.....*S. calida* (Linné).
- Basal part of the second abdominal sternite regularly, convexly sloping, not raised more on its middle than on its sides. Apical part of the clypeus as a rule flattened, never excavated. Total length, 22 to 25 mm. (after Maidl).
S. kohli Maidl.
- 9.¹ Two or three apical abdominal tergites with more or less extensive white markings; the rest of the body black; the clypeus, a few spots on head, mandibles, under side of the antennæ, and terminal joint of the front tarsi, ferruginous-

¹ *S. mirabilis*, *S. analis*, *S. spiniventris*, and *S. negusi* are, with regard to structural characters, very similar in the females, although the males can be easily separated. Since I have not seen the female of *S. negusi*, I was compelled to use here chiefly the coloration, on which Maidl's key is based for a large part.

- red. Shape of the clypeus much as in *S. analis*; elongate and piriform; its apical part comparatively long and narrow. Length (h. + th. + t. 1 + 2), 20 mm. This species exists in the Upper Katanga; I have seen a ♀ from Zanzibar.....*S. mirabilis* Guérin.
Terminal abdominal tergites orange or ferruginous-red.....10.
10. The four apical abdominal tergites and sternites for the greater part orange- or ferruginous-red. Shape of the clypeus as described for *S. mirabilis*. Length (h. + th. + t. 1 + 2), 21 mm.....*S. analis* Saussure.
Only three apical abdominal tergites and sternites for the greater part orange- or ferruginous-red. Clypeus, although distinctly piriform and longer than broad, yet clearly shorter than in *S. analis* and *S. mirabilis*; its apical part comparatively shorter and broader.....11.
11. Clypeus ferruginous-red, with distinct punctures which are only a little finer than on the vertex; its surface dull, its terminal portion a little narrower, never with a preapical transverse impression. Length (h. + th. + t. 1 + 2), 19 to 23 mm.....*S. spiniventris* (Illiger).
Clypeus orange-yellow or ferruginous-red, somewhat shining; its punctures distinctly finer than on the vertex; its terminal portion somewhat broader; as a rule with a more or less distinct, transverse, preapical impression. The coloration is the same as in the preceding species. Total length, 21 to 26 mm. This species was found northwest of Lake Tanganyika; (after Maidl).
S. negusi R. du Buysson.

Males¹

1. Second abdominal sternite with two strong and sharp, longitudinal carinae near its base. Shape and sculpture of the propodeum as in the ♀. Clypeus (Fig. 234) with broadly truncate apical margin; its entire surface finely shagreened. Terminal hook of the antennae (Figs. 235 and 236) very long and slender; strongly curved. Length (h. + th. + t. 1 + 2), 13 mm.
S. rufopicta Tullgren.
Second abdominal sternite without longitudinal carinae near its base. Lateral angles of the propodeum forming more or less distinct, spiny protuberances; its inferior ridge not flattened into a lamella.....2.
2. Clypeus short piriform; about as long as broad or slightly longer; pointed towards its rounded apex (somewhat as in *S. cornuta* ♀). Second abdominal sternite often with spiny protuberances near its hind margin.....3.
Clypeus differently shaped; never pointed towards its apex, which is either broadly truncate or emarginate. Mandibles never with basal protuberances on their external face.....4.

¹ As was shown very completely by Maidl, there is much individual variation in the shape and development of the secondary sexual characters (shape and protuberances of the mandibles, protuberances of the second sternite, shape of the clypeus, etc.) of the *Synagris* males. A remarkable correlation exists between the development of these characters and the size of the specimens, the larger individuals always exhibiting these specific peculiarities in the most distinct manner. The male of *S. ornatissima* Maidl is unknown.

3. Mandibles, as a rule, with more or less marked protuberances or horns on their external face near their base; their inner margin abnormally incurved and dentate. Clypeus scarcely longer than broad; with narrowly rounded apex. Coloration as in the ♀: black, with the four terminal abdominal segments and the clypeus ferruginous-red. Total length, 22 to 25 mm. (after Moidl).

S. negusi R. du Buysson.

Mandibles never with basal protuberances on their external face; their inner margin nearly as in the ♀. Clypeus slightly longer than broad; with broadly rounded apex. Coloration of the typical form black, with head, thorax, legs, and base of the abdomen more or less brownish-red; clypeus and spots on head, thorax, and abdominal tergites 1 to 6, whitish-yellow. Length (h. + th. + t. 1 + 2), 23 mm. *S. æstuans* Saussure.

4. Apical margin of the clypeus deeply and distinctly emarginate, bidentate, or bifid. 5.
Apical margin of the clypeus straightly or roundly truncate, or very feebly emarginate, never bidentate. 7.

5. Apical margin of the clypeus semicircularly emarginate; its lateral edges short, sharply dentate, and widely separate. Mandibles shaped almost as in the ♀. Second abdominal sternite with two transverse, more or less conspicuous, preapical ridges (as in the ♀). Dorsal areas of the propodeum rugosely reticulate; its concavity with distinct transverse striæ. Length (h. + th. + t. 1 + 2), 19 mm. *S. abyssinica* Guérin.

Apical margin of the clypeus deeply bifid; its lateral edges much broader and bluntly dentate. Mandibles abnormal; very different in shape from those of the ♀. 6.

6. Clypeus much broader than long; its apex very deeply and narrowly emarginate; its lateral edges forming two broad, blunt appendages. Mandibles, as seen in front, with a broader basal half and a distinctly constricted, narrower apical half. Second abdominal sternite often with more or less developed preapical protuberances or spines. Striation of the concavity of the propodeum very distinct and extending over its dorsal areas. Coloration as in the ♀, the three or four terminal abdominal tergites more or less extensively white. Total length, 20 to 27 mm. (after Moidl).

S. mirabilis Guérin.

Clypeus nearly as long as broad; not so deeply bifid as in the preceding species; its lateral edges triangular. Mandibles deeply emarginate and dentate along their inner margin, but not constricted into a broader, basal and a narrower, apical half. Second abdominal sternite without preapical protuberances. Striation of the concavity of the propodeum very feeble; its dorsal areas rugosely reticulate. Coloration variable, as in the ♀. Total length, 16 to 20 mm. (after Moidl). *S. huberti* Saussure.

7. Second abdominal tergite much widened, feebly depressed on each side of its middle line; the depressed parts margined by two irregular folds or ridges which look like an artificial deformation of the integument; the second sternite with two more or less marked, often extremely strong, preapical protuberances. Mandibles almost normal; scarcely different from those of the ♀. Hind tarsi much broadened and comparatively short. Striation

of the propodeum more or less broken up into a rugose reticulation on its dorsal areas. Length (h. + th. + t. 1 + 2), 23 to 24 mm.

S. crassipes Kohl.

Second abdominal tergite normal; without longitudinal ridges. Mandibles more or less deformed by notches and teeth of their inner margin; often strongly curved. Hind tarsi normal; slender. Striation of the propodeum covering uniformly its concavity and its dorsal areas. 8.

8. Clypeus about as broad as long, or slightly longer; its apical part distinctly elongate and straightly truncate; its surface more or less depressed on its apical part, often with a deep, semicircular, terminal excavation margined by strong ridges and discolored in the bottom. Second abdominal sternite, as a rule, with more or less developed preapical spines or protuberances. Anterior face of the middle coxæ raised into a more or less distinct median tubercle. Middle femora not flattened. Length (h. + th. + t. 1 + 2), 18 to 26 mm. *S. spiniventris* (Illiger).

Clypeus never semicircularly excavated at its apex, at most with a narrow, terminal, depressed margin. Second abdominal sternite never with spines. either flat or with two blunt, more or less distinct, preapical protuberances. . 9.

9. Clypeus, as a rule, distinctly longer than broad; its elongate terminal part more or less flattened or slightly depressed on its sides; its apical margin scarcely thickened, straightly truncate with rounded edges or feebly emarginate. Middle femora distinctly flattened; their anterior face with a feeble oblique depression towards their base; their inferior margin markedly projecting on its apical third. Length (h. + th. + t. 1 + 2), 16 to 22 mm.

S. analis Saussure.

Middle femora normally convex at their anterior face. Clypeus of different shape. 10.

10. Clypeus as broad as, or distinctly broader than, long; its terminal part very short and broadly truncate; its apical margin either straight or slightly emarginate, with sharp, somewhat raised lateral edges; often with a narrow, depressed, terminal lamella. Anterior face of the middle coxæ without raised median tubercle. Length (h. + th. + t. 1 + 2), 18 to 23 mm.

S. calida (Linné).

Clypeus about as long as broad; its terminal part distinctly longer and more narrowly truncate; its apical margin straightly truncate, swollen, and somewhat projecting above the terminal, almost vertical lamella. Length (h. + th. + t. 1 + 2), 19 mm. *S. kohli* Maidl.

76. *Synagris analis* H. de Saussure

Belgian Congo.—Banana, 2 ♂♂, September 1915 (Lang and Chapin Coll.). This species has been found also northwest of Lake Tanganyika¹ and at Lukonzolwa (Lake Moero).² I have seen a female and a male from Portuguese East Africa, in the collection of Cornell University.

¹ F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 257.

² E. Zavattari, Boll. Mus. Zool. Anat. Comp. Torino, XXII, No. 555, 1907, p. 3 (*S. heydeniana* Saussure).

The Congo specimens belong to the typical form which is black with the four (♀) or five (♂) apical abdominal segments entirely or partly orange-red. The clypeus, the frontal raised triangle between the antennæ, the under side of the flagellum, and the terminal joint of the tarsi are ferruginous-red or orange-yellow in the female, bright orange in the male.

Maidl has described as "subspecies" *nigroclypeata* Maidl, a color form from German Southwest Africa, which hardly deserves a name as a variety; it differs from the typical form only in that the clypeus in the female is more or less extensively black; the males from the same region do not present that peculiarity.

S. analis is apparently restricted to the eastern and southern savannah regions not being found west of the Nile nor in the Central African rain forest. It ranges on the East Coast from Port Elizabeth to Eritrea; on the West Coast from 20° S. to 5° S. (Chinchoxo, at the mouth of the Shiloango River); its northern limits in the interior are Uganda, the northwestern corner of Lake Tanganyika, Lake Moero, and Northern Rhodesia. The records of this species for Madagascar and Senegal seem to me extremely doubtful.

I was unable to discover any reliable morphological character to separate *S. analis* and *S. mirabilis* in the female, though the males of both species can be easily recognized.

77. *Synagris kohli* Maidl

Belgian Congo.—Poko, 1 ♂ (Lang and Chapin Coll.). Previous records from the Belgian Congo¹ are all from the eastern forest region: Beni, Mawambi, Moera, and 50 km. east of Kasongo. The Buamba forest (in the valley of the Semliki River), where this species was also collected, extends partly into the territory of the Belgian Congo.

The coloration of this species is similar to that of *S. analis*, the four (♀) or five (♂) apical abdominal segments being more or less extensively orange-red; the clypeus, however, is entirely or nearly entirely black in both sexes.

The localities from which this species has been definitely recorded seem to show that it is restricted to the West African forest province: Togo, Cameroon, Spanish Guinea, Belgian Congo, and Uganda.

78. *Synagris spiniventris* (Illiger)

Belgian Congo.—Faradje, 30 ♀ ♀ and 7 ♂ ♂, from November 1912 to January 1913; Garamba, 1 ♀ and 2 ♂ ♂, July 1912; Aba, 1 ♀,

¹ F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 260.

December 1912; north of the Aka River, 1 ♀, September 1911 (Lang and Chapin Coll.). Kabare, 1 ♂, August 1914 (J. Bequaert Coll.).

This species is black with the three (♀) or four (♂) apical segments of the abdomen partly or entirely orange-red; the clypeus and spots on the head, on the antennæ, and on the legs, ferruginous-red.

Ethology. E. Roubaud¹ has published valuable information with regard to the habits of this species, which he observed in the French Congo, the Dahomey, and the Sudan; it is, like its relatives, a true potter wasp, building mud cells aggregated in an irregular mass; the different cells may be externally distinct even in a completed nest (*type dissocié* of Roubaud) or they may be hidden beneath a general and uniform covering of mud (*type compact* of Roubaud). Under normal conditions, when food is plentiful, the female lays an egg, fills the cell with caterpillars, and then walls up the orifice, taking no further care of her offspring; this is the ordinary way, called by Roubaud *provisioning in mass* ("approvisionnement banal en masse"). However, when, owing to seasonal or climatic influences, food becomes scarcer, the mother wasp lays an egg in her cell of earth; then, without haste, after having guarded it for some time, she begins to collect a small provision of entire, paralyzed caterpillars for the time of hatching; when the larva has started to feed, the female continues its provisioning but in a slow and regular manner; as soon as the larva has attained three-quarters of its full size, the wasp encloses it in its cell with the last provisions. This is a *progressive provisioning* ("approvisionnement ralenti") from day to day, which gives the wasp the necessary leisure to guard the larva and watch its growth.

In *S. spiniventris*, progressive provisioning is still optional, and one observes all the transitional stages between this behavior and the normal provisioning in mass. The mother wasp shows great skill in adapting her habits to the external conditions. It is interesting to note that, according to Roubaud's observations, in another African solitary wasp, *Odynerus tropicalis* Saussure (p. 185), progressive provisioning has become the rule.

Many interesting parasites have been reared by Roubaud from the nests of *S. spiniventris*, the two most typical being a large Ichneumonid, *Osprynchotus violator* (Thunberg) and a Rhipiphorid, *Macrosiagon* (*Emenadia*) *ferugineum* (Fabricius) var. *flabellatum* (Fabricius). The larvæ of both these insects feed externally on the wasp larva. A smaller Ichneumonid, *Mesostenus tripartitus* Brullé, is less common than the two preceding parasites.

¹ C. R. Ac. Sc. Paris, CXLVII, 1908, p. 695; Ann. Soc. entom. France, LXXIX, 1910, pp. 2 and 3, Tab. I, figs. 1 and 4; Tab. IV, figs. 4 and 5; Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 3-16, figs. 1, 3, and 5. I have followed Maidl in considering Roubaud's observations on his "*S. calida*" as referring to *S. spiniventris* (Illiger).

Mr. H. Lang collected at Faradje mud nests of *S. spiniventris* together with their inhabitants. They were fixed inside native huts, on or near the ground, sometimes on sticks. These nests are of the same type as those of other species of the genus; the cells are usually large, measuring as much as 55 mm. in length and 35 mm. in width; in one of the cells were found light green caterpillars.

79. *Synagris calida* (Linné)

Belgian Congo.—I have seen 85 ♀♀ and 43 ♂♂ from the following localities: Banana, Zambi, Boma, Matadi, Thysville, Coquilhatville, Stanleyville, Bafwasende, Avakubi, Panga, Banalia, Medje, Garamba, Faradje, and Aba (Lang and Chapin Coll.); Kirundu, 1 ♀ (J. Bequaert Coll.). This is, together with *S. cornuta* (Linné), the most abundant species of the genus in the Belgian Congo. It had previously been recorded from Banana,¹ Mawambi,² and numerous other localities.³

The coloration is the same as in *S. spiniventris* (Illiger).

Ethology. The first observations on this species were made by Gueinzus in Natal.⁴ He observed how a female was building a mud cell with red earth on the surface of a door, and how she collected larvæ of Noctuidæ. In one of the nests described by Smith, four cells were visible. Taschenberg has described as a parasite of this species an Ichneumonid, *Atractodes gueinzii* Taschenberg, which, according to the description, is probably one of the previously described *Osprynchotus*; Gueinzus saw a female of one of these parasites piercing the mud walls of the wasp cells with its ovipositor.

The habits of *S. calida* (Linné) have also been studied by E. Roubaud⁵ in the French Congo and the Casamance. According to these observations they are similar to those of *S. spiniventris* (Illiger), to which the reader may be referred.

Mud nests of *S. calida* (Linné) were collected by Mr. H. Lang at Stanleyville. One of them is of very large size, measuring 9 cm. in length, 6.5 cm. in width, and 4 cm. in height; it consists of 10 cells, which are placed side by side, their longest axis almost vertical to the surface to which the nest was attached. These nests were stored with green caterpillars and from

¹ C. Ritsema, Tijdschr. v. Entom., XVII, 1874, p. 97 (*S. combusta* Saussure).

² A. v. Schulthess, Wiss. Ergebn. D. Z. Afr. Exp., (1907-08), IV, Lf. 10, 1912, p. 292 (*S. mandibularis* Saussure).

³ F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 268-269.

⁴ Gueinzus, Trans. Ent. Soc. London, (2), V, 1858, p. 9; F. Smith, idem, (2), III, 1856, p. 128; Taschenberg, Zeitschr. f. d. ges. Naturw. Halle, XXXIX, 1872, pp. 1-5.

⁵ C. R. Ac. Sc. Paris, CXLVII, 1908, p. 696; Ann. Soc. entom. France, LXXIX, 1910, pp. 3-7, Pl. I, figs. 1 and 3, and Pl. II; Ann. Sc. Nat. Zool., (10), 1, 1916, pp. 3-16, figs. 2 and 4. According to Maidl, Roubaud's *S. sicheliana* is the true *S. calida* (Linné).

one of the cells were reared two specimens of the rhipiphorid beetle, *Macrosiagon* (*Emenadia*) *ferrugineum* (Fabricius) var. *flabellatum* (Fabricius).

***Synagris abyssinica* Guérin**

I have figured the tarsal claw of the female of this species (Fig. 230) in order to compare it with that of *S. cornuta*.

This is one of the common species in South and East Africa; its northern limits are apparently the mouth of the Congo on the western coast, and Abyssinia in the East; inland it was found as far north as the Katanga and the northeastern Congo; towards the south it extends to Port Elizabeth and latitude 20° S. Its range covers almost exactly that of *S. analis* Saussure.

Three different color forms are known for this species; they may be separated as follows:

1. Black, with the three (♀) or four (♂) apical abdominal segments ivory-white.
Clypeus, spots on head and mandibles, ferruginous-red.
var. *albofasciata* Maidl.
Apical abdominal segments orange-yellow. Clypeus and spots on head and mandibles, more or less ferruginous or orange-red. 2.
2. Black, with the three (♀) or four (♂) apical segments orange-yellow.
typical *S. abyssinica* Guérin.
Black, with the four (♀) or five (♂) apical segments orange-yellow.
var. *emarginata* (Saussure).

80. ***Synagris abyssinica* Guérin, typical form**

The typical form exists in the northeastern part of the Belgian Congo: Faradje, 1 ♀, November 1912; Garamba 1 ♀ and 1 ♂, July 1912 (Lang and Chapin Coll.). It was previously recorded from the same region: between Irumu and Mawambi.¹

81. ***Synagris abyssinica* var. *emarginata* (Saussure)**

Belgian Congo.—Kwamouth, 1 ♀, May 24, 1915 (Lang and Chapin Coll.).

This color form was known from the eastern part of the Belgian Congo (Beni, Kasindi, northwest of Lake Tanganyika) and the Katanga (Kambove).²

¹ A. v. Schulthess, Wiss. Ergebn. D. Z. Afr. Exp., (1907-08), IV, Lf. 10, 1912, p. 292 (*S. minuta* Saussure).

² F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 277.

82. ***Synagris abyssinica* var. *albofasciata* Maidl**

Belgian Congo.—Faradje, 1 ♀, April 1911 (Lang and Chapin Coll.).

83. ***Synagris crassipes* Kohl**

Belgian Congo.—Medje, 1 ♀ and 1 ♂, July and September 1910; Avakubi, 1 ♂, October 1909; Stanleyville, 1 ♂, April 1915 (Lang and Chapin Coll.). Previously recorded from the northeastern Belgian Congo: Mawambi, Beni, Moera.¹

This species is practically entirely black. It is a most remarkable form which seems to be restricted to the rain forest of the West African region; it occurs in Cameroon, Spanish Guinea, French Congo, Belgian Congo, and Uganda.

84. ***Synagris æstuans* (Fabricius)**

Plate I, Figure 6

The females which I have seen from the Congo belong to the typical form described by Fabricius.

Black; mandibles, clypeus, antennæ, cheeks, thorax (with the exception of mesonotum, scutellum, anterior part of postscutellum, and tegulæ), legs, and extreme base of abdomen, ferruginous-red. A white transverse spot on the front between the antennæ; eight white spots on the thorax (one on each side of the pronotum, scutellum, and postscutellum; and on the hind part of each tegula); and four larger, transverse white spots on the abdomen (one on each side, near the hind margin of tergites 1 and 2). This coloration is very similar to that of *Odynerus (Rygchium) æstuans* (Saussure), from which the species can be easily separated by the number of joints in the maxillary palpi, the shape of the clypeus, and the presence of two tooth-like tubercles on the postscutellum.

The only male in the collection is richer reddish-brown and presents more numerous white spots. The head, thorax, legs, and two basal segments of the abdomen are largely ferruginous-red; the vertex and mesonotum are blackish; the apical margins of tergites 1 and 2 deep black, the black on tergite 2 extending triangularly on its middle line. The following markings are ivory-white: the clypeus except for its margins; a small frontal dot; a narrow stripe in the inferior part of the emargination of the eyes; a broad band on the cheeks; 8 broad spots on the dorsal face of the thorax located as in the female; and lateral transverse, ovale spots on tergites 1 to 6, those on tergite 2 much the largest.

Belgian Congo.—Medje, 5 ♀ ♀, July 1910 (Lang and Chapin Coll.); 1 ♀ from the Uele region and 1 ♂ from Duru, both collected by Dr. J. Rodhain.

¹ F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 283.

This typical *S. æstuans* has been previously recorded from the Belgian Congo: Upper Maringa; between Mawambi and Irumu.¹ Its distribution covers the West African forest region: Sierra Leone, Togo, Cameroon, Fernando Po, French Congo, Belgian Congo, and Uganda.

W. A. Schulz² has recorded from Fernando Po a variation of *S. æstuans* in which the scutellum is uniformly black, the remaining being apparently the same as in the typical form.

The var. *rufa* ♀ Stadelmann³ has head and thorax entirely rufous-red; the white spots are wanting on the thorax, except for a trace of such on the sides of the pronotum; tergites 1 and 2 with a spot on each side as in the typical form. This variety seems to be strictly East African; it has been recorded from German East Africa and Nyasaland only.

***Synagris huberti* H. de Saussure**

The range of this species falls entirely within the boundaries of the West African Forest Province; it is known from Sierra Leone, the Gold Coast, Togo, Cameroon, Spanish Guinea, French Congo, Belgian Congo, and Uganda.

The following is a synoptical table of its color forms:

1. ♀.—Body without white or yellowish-white markings; black, with the head, thorax, and base of the abdomen, more or less extensively brownish-red (as in typical *S. cornuta*). ♂ similar, but the clypeus, spots on the face and on the pronotum, yellowish.....var. *clypeata* (Mocsáry).
At least the abdomen with yellow or yellowish-white spots.....2.
2. ♀.—Second abdominal tergite with two large, nearly fused, whitish-yellow spots; the distribution of black and brownish-red as in the var. *clypeata*.
♂ unknown.....var. *bimaculata* Maidl.
The three basal abdominal tergites each with a pair of whitish-yellow spots...3.
3. Distribution of black and brownish-red similar to that of the var. *clypeata*; the pronotum, scutellum, and postscutellum brownish-red; there are more or less numerous, whitish-yellow spots on head and thorax.
typical *S. huberti* Saussure.
Similar to the preceding, but the black color more extended on head and thorax; the pronotum, scutellum, and postscutellum black....var. *nigricans* Maidl.

The typical form and the var. *nigricans* are not known from the Belgian Congo. *S. huberti* var. *bimaculata* Maidl was found in the northeastern Belgian Congo: Ukaika near Mawambi.⁴

¹ F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 288.

² Spolia Hymenopterologica, 1906, p. 321.

³ Deutsch Ost-Afrika, IV, 1898, Hym., p. 31, Pl., fig. 9.

⁴ F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 296.

85. *Synagris huberti* var. *clypeata* (Mocsáry)

Belgian Congo.—Medje, 1 ♀, July 1910 (Lang and Chapin Coll.).

This variety was previously recorded from the northeastern Congo (between Mawambi and Irumu).¹

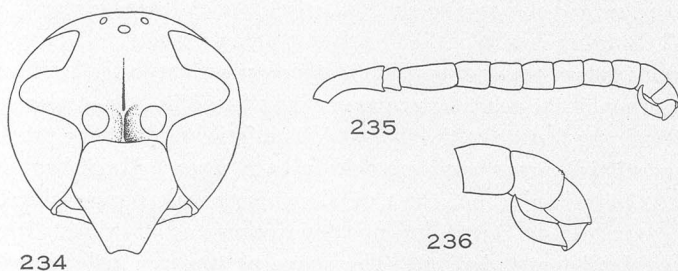
A nest of the var. *clypeata* has been described by R. du Buysson² from the Gaboon; it was a mud lump, 9 cm. long and 3.5 cm. broad, containing 5 cells, and fixed on a tree branch.

Maidl considers *S. rufopicta* Tullgren a synonym of this variety, whereas I believe it is a distinct species.

86. *Synagris rufopicta* Tullgren

The female has been satisfactorily described by Tullgren; the male was hitherto unknown.

♂.—Head (Fig. 234) subcircular, as seen in front. Clypeus slightly shorter than in the female; broadly piriform; about as wide as long; its apical margin broadly truncate, very feebly sinuate in its middle, with bluntly rounded lateral angles; its surface uniformly, but very feebly convex. Mandibles normal; strongly pointed; shaped almost exactly as in the female; their inner margin straight, with three feeble notches. Antennæ (Fig. 235) elongate; joints three to eleven longer than broad; terminal hook-like joint (Fig. 236) very long, gradually tapering towards



Figs. 234–236. *Synagris rufopicta* Tullgren.

Fig. 234. Head in front, ♂. Fig. 235. Antenna, ♂. Fig. 236. Terminal joints of antenna, ♂.

a long and sharp apex, strongly curved on its middle, its apex reaching near the base of the ninth joint.

Thorax and abdomen as in the female; the second sternite also with a strong carinate longitudinal ridge on each side of its middle line, in its basal half. Middle femora distinctly flattened; their inferior margin slightly projecting on their basal third.

¹ F. Maidl, *op. cit.*, p. 296.

² Revue d'Entom., Caen, XXVII, 1908, p. 214.

Punctuation as in the female. Clypeus densely and finely shagreened all over, almost longitudinally striate; without punctures.

Coloration also similar to that of the female; the clypeus bright-yellow with brownish-red margins; the thorax is covered with the same velvety, ochre-yellow pubescence which is found in *S. æstuanus* Saussure; this is also true in the female.

The chief structural characters of this species, in both sexes, reside in the shape of the clypeus and mandibles; the sharply bidentate postscutellum; the slightly projecting tooth-like lateral angles of the propodeum which continue beneath as broad lamellæ; and the two strongly carinate, longitudinal ridges in the anterior half of the second abdominal sternite. Tarsal claws bifid at their apex; without an accessory tooth in the middle. Labial palpi composed of three slender joints, as in the other *Synagris*; in all my specimens there are only three joints left on the maxillary palpi.

The coloration of the female and male from Stanleyville and of the female from the Oso River is the same as described for the type specimen from Cameroon; it imitates in the most striking manner that of the subtypical *S. cornuta* (Linné). Another female collected between Masisi and Walikale, is much darker, the black color invading nearly the whole of the abdomen, pleura, scutellum, and propodeum.

Length (h. + th. + t. 1 + 2): ♀, 13 to 17 mm.; ♂, 13 mm.

Belgian Congo.—Stanleyville, 1 ♀ and 1 ♂, May 1915 (Lang and Chapin Coll.). Oso River, 1 ♀, February 18, 1915; between Masisi and Walikale, 1 ♀, January 3, 1915 (J. Bequaert Coll.).

Synagris imitator R. du Buysson, 1908, is undoubtedly the same species as *S. rufopicta* Tullgren, 1904. R. du Buysson describes the longitudinal ventral carinæ as belonging to the first sternite, but this is certainly a mistake; all the other details of the description agree perfectly.

I cannot follow Maidl in uniting *S. rufopicta* with *S. huberti*. The longitudinal carinæ of the second sternite are only found in this species and not in *S. huberti*; furthermore, the shape of the inferior ridge of the propodeum is very peculiar; these characters hold in both sexes. Maidl has seen the male of *S. huberti* only; but the true *S. rufopicta* male is very different, as will be easily seen in comparing my description and drawings with those given by Maidl for *S. huberti*. The shape of the terminal joints of the antennæ may also be peculiar, but these organs are not described for *S. huberti*.

The typical *S. rufopicta* Tullgren has the same coloration as *S. huberti* var. *clypeata* (Mocsáry). It is remarkable that the following variety is very similar to *S. huberti* var. *bimaculata* Majdl.

87. *Synagris rufopicta* var. *mimetica*, new variety

This remarkable color form reproduces almost exactly the coloration found in *S. cornuta* (Linné) var. *basalis* (Mocsáry) (compare p. 209) and

offers one of the best illustrations of the parallel variations in color pattern which are so frequently met with among the *Vespidæ*.

♀.—The structural characters are exactly the same as in the typical form; the longitudinal carinæ on the second sternite are very pronounced and sharp, and the inferior ridge of the propodeum is flattened into a lamella.

Vertex, front, apex and inner margin of mandibles, mesonotum, sutures of the pleura, and major part of the abdomen, black. Clypeus, a spot between the insertion of the antennæ, antennæ, major part of the mandibles, thorax (except for the mesonotum and the pleural sutures), tegulæ, legs, basal half of the first tergite, the first sternite entirely, and basal half of sternite two (including its carinæ), bright ferruginous-red. A broad, pale yellow band covers about two-thirds of the second tergite; it starts at a short distance from the base of the tergite and is slightly emarginate in the middle on its anterior and posterior margin. Wings dark brown, with purplish effulgence.

Length (h. + th. + t. 1 + 2), 16.5 mm.

Belgian Congo.—Medje, 1 ♀, September 1910 (Lang and Chapin Coll.).

Subgenus **Rhynchagris** Maidl

This group includes only one species: *S. vicaria* Stadelmann. Its typical form has the body mostly black; the three (♀) or four (♂) apical abdominal segments present ivory-white transverse bands or spots. Clypeus, antennæ, head, mandibles, and legs are more or less tinged with ferruginous-red. Total length: ♀, 18 to 23 mm.; ♂, 14 to 18 mm. It has been found in the Katanga: 150 to 200 miles W. of Kambove, Lofoi.¹

The var. *luteopicta* Maidl has about the same color pattern as the type, but the apical segments of the abdomen are orange-yellow, instead of white; it has been recorded from Uganda and might perhaps reach the northeastern part of the Belgian Congo.

Subgenus **Pseudagris** H. de Saussure

Maidl describes three species in this group merely on differences in the color pattern. I think it would be more rational to consider them as varieties of a single specific type, if there are really no morphological characters to separate them. This I cannot decide since I have seen only one of these forms; it will be well to await the discovery of the males before attempting to solve this problem.

¹ F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 251.

Key to the Congo Species of the Subgenus *Pseudagris*.

1. Body almost entirely black; the under side of the antennæ and a few spots on mandibles and legs, ferruginous-red. Total length, 20 to 24 mm. Described from the northeastern Belgian Congo: Moera.¹.....*S. aterrima* Maidl.
Body black, with abundant brownish-red markings on the thorax and first abdominal segment; the clypeus, antennæ, and legs of the same color; the mesonotum black. Length (h. + th. + t. 1 + 2), 13 to 16 mm.....2.
2. No yellowish-white spots.....typical *S. versicolor* A. v. Schulthess.
Yellowish-white spots on head, thorax, and abdomen.
S. versicolor var. *meade-waldoi* Maidl.

88. *Synagris versicolor* A. v. Schulthess

Belgian Congo.—Stanleyville, 6 ♀ ♀, April 1915 (Lang and Chapin Coll.).

This locality extends the range of the species far inland; it was previously known from Sierra Leone, Togo, Cameroon, and Fernando Po.

This is a very interesting form on account of its striking resemblance to certain *Odynerus* of the subgenus *Rygius*. However, the maxillary palpi are distinctly five-jointed; their fifth joint is elongate and rounded at its apex, and it is hard to believe that there was a sixth joint in the pupal stage. The labial palpi are undoubtedly three-jointed; but the shape of the joints is very different from what is found in *S. cornuta* (Linné).

All the specimens I have seen belong to the typical form. The var. *meade-waldoi* Maidl, described from Uganda, might occur in the eastern part of the Belgian Congo.

Rhynchalastor G. Meade Waldo

The characters of this genus can be seen from the key. Its most interesting peculiarity is the shape of the clypeus, which, in both sexes, is cordate and ends in a distinctly pointed apex. It has been claimed that in the solitary diplopterous wasps the apex of the clypeus is always either truncate or emarginate. Dalla Torre² gives among the general characters of his subfamily Eumenidinae "Kopfschild nie mit einem Zahne endigend"; and Zavattari³ also states that the clypeus in his family "Eumeneidæ" never ends in a single tooth. *Rhynchalastor* is a fine illustration of a true solitary

¹ F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 247.

² Genera Ins. Vespidae, 1904, p. 9.

³ Arch. f. Naturgesch., LXXVIII, Abt. A, 1912, Heft 4, p. 3.

wasp with sharply pointed clypeus. Moreover, in *Synagris cornuta* (Linné) the clypeus of the female ends in a projecting, although blunt apex, which is very often more distinct than in some social wasps, such as *Polistes*. It is, on the other hand, almost useless to point to the numerous social wasps in which the apex of the clypeus is truncate or emarginate, either in both sexes or in the males, such as *Vespa*, *Charterginus*, *Clypearia*, etc. The shape of the clypeus therefore cannot be used as a character to separate the solitary diplopterous wasps and the social wasps as two families or subfamilies.

I have been able to study one male of the genotype, *Rhynchalastor fuscipennis* G. Meade Waldo, which was described, on the female only, from German East Africa. This wasp is very similar to *Odynerus ferruginatus* J. Bequaert (= *Stenodynerus ferrugineus* A. v. Schulthess) — so similar, indeed, that A. v. Schulthess¹ redescribed it as the var. *mafiensis* of that *Odynerus*. Yet I agree with Meade Waldo that the shape of the clypeus is a character important enough to include *R. fuscipennis* in a distinct genus. However, the other generic characters given in the diagnosis seem of little importance. The labial palpi were described as 3-jointed; but, as first pointed out by A. v. Schulthess¹ and as recognized later on by Meade Waldo,² there is an evanescent fourth joint. The shape of the second cubital cell, which was originally said to be petiolate, must be variable. In my specimen, which comes from Lourenzo Marques, both intercubital nervures are united on the radius; the second cubital cell can hardly be called petiolate.

I have also seen one female of *Odynerus ferruginatus* J. Bequaert, from Lourenzo Marques. In comparing it with my specimen of *Rhynchalastor fuscipennis*, I find that, although both species are remarkably similar in general shape and coloration, there are many good characters by which they can be separated, even apart from the shape of the clypeus.

A. Schletterer described in 1891,³ from the Belgian Congo (Equator), an *Odynerus xanthosoma* which undoubtedly belongs in *Rhynchalastor*. This has been shown by Meade Waldo,⁴ who was able to study the type specimen. Besides, the pointed shape of the clypeus is accurately figured by Schletterer. I have not yet seen specimens of this *Rhynchalastor xanthosoma* (Schletterer). In comparing the description with my specimen of *R. fuscipennis*, it seems to me that these two forms are closely allied, if not mere synonyms. If this proves to be true, Schletterer's name will claim priority.

Rhynchalastor was thus far only found in the Ethiopian region, and nothing is known of its habits.

¹ Soc. entomol., XXIX, 1914, p. 73.

² Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 501.

³ Ann. Soc. entom. Belgique, XXXV, 1891, p. 24, Pl. I, fig. 10.

⁴ Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 501.

EPIPONINÆ

Belonogaster H. de Saussure

An exhaustive monograph of this genus has been published in recent years by R. du Buysson.¹ The identification of its species is now easy and we can refrain from any remarks concerning its taxonomy.

Belonogaster possesses several remarkable characters. The antennæ are 11-jointed in the female, 12-jointed in the male. The labial palpi are 3-jointed, and the maxillary palpi 5-jointed. The eyes bear very few, scattered, stiff hairs, apparently more abundant in some species than in others.

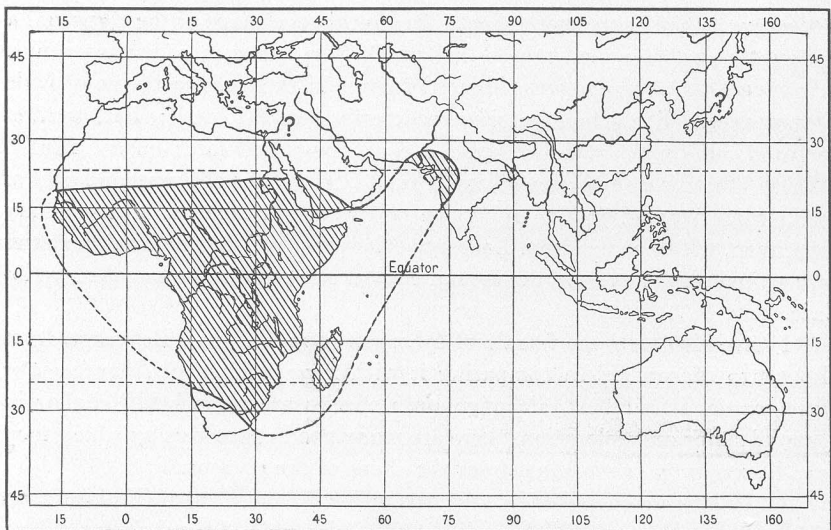


Fig. 237. Distribution of the genus *Belonogaster*.

The mesopleura are very simply built: there is no trace of a suture subdividing the episterna or separating the epimera.

This genus is practically endemic in the Ethiopian region, including the Malagasy Islands and Southern Arabia (Fig. 237). Only one species, *B. indicus* Saussure, extends from East Africa into British India, and it is also recorded from Judæa and Japan; but the last two localities are some-

¹ Monographie des Vespides du Genre *Belonogaster*, Ann. Soc. entomol. France, LXXVIII, 2, 1909, pp. 199-270, Pls. II-VII.

what doubtful. In the Central African mountains some species are found as high as 2000 m. Of the 35 species, 9 are restricted to the Malagasy sub-region; 2 are only found in Southern Arabia and on Sokotra; 8 are restricted to South and East Africa, one of these, however, extending into the Oriental region; 6 are strictly West African forms; and the remaining 10 species are widely distributed over the continental part of the Ethiopian region.

Ethology. The life history of *Belonogaster* presents many interesting points, some of which are still but superficially known. The earliest description of its nest is given by F. Smith for *B. junceus* (Fabricius) (= *Raphigaster guineensis* Smith) and for another species erroneously recorded as *Mischocyttarus labiatus*. Both nests were collected by Gueinzus at Port Natal.¹ Brief notes on the nest of *B. junceus* (Fabricius) were also contributed by P. Magretti² and A. Tullgren.³ The first drawings of a *Belonogaster* nest were published in Brehm's Thierleben for an unidentified species from South Africa; later by H. de Saussure for an unidentified species from Madagascar,⁴ and by Kirby for *B. saussurei* Kirby from Sokotra.⁵ In his Monograph, R. du Buysson gives full details as to the nidification of many species, and he describes also the larva and pupa. Only recently, however, did E. Roubaud publish the first field observations on these insects.⁶

Some species build inside of houses, at the entrance of caves, or under overhanging rocks; others prefer to attach their constructions on or inside of tree trunks, or to the under side of leaves. I once found in a very open bush steppe, at Kabare, near the south shore of Lake Albert Edward, a nest of the common *B. junceus* (Fabricius) placed underground in the upper part of the burrow of a wart-hog, together with a mud nest of a *Peloparus*.

The nests of *Belonogaster*, like those of *Polistes* and *Ropalidia*, belong to the type called by H. de Saussure⁷ "stélocyttare, gymnodome, latérinide." The slightly hexagonal paper cells are alike and form a single layer. There is no cover, the comb hanging completely free and with the opening of its cells directed downwards. As a rule, the nest is fixed to its support by an eccentric pedicel, originating from the basal end of the comb. The base of each new alveolus is much narrower than the top of a completed cell; the cell is built farther and gradually widened at the top as the growth of the larva progresses. This process causes the various alveoli to diverge from each other, producing a strong outward curving of the whole comb. The

¹ Trans. Entom. Soc. London, (2), III, 1856, Proc., p. 129.

² Ann. Mus. civ. Genova, XXI, 1884, p. 599.

³ Ark. f. Zool., I, 1904, p. 453.

⁴ Abhand. Senckenberg. naturf. Ges., XXVI, 2, 1900, p. 206, figs. 1 and 2.

⁵ Nat. Hist. of Sokotra by H. D. Forbes, Zool., Hym., 1903, p. 248.

⁶ C. R. Ac. Sc. Paris, CLI, 1910, pp. 553-556; Ann. Sc. nat. Zool., (10), I, fasc. 1, 1916, pp. 110-139.

⁷ Etudes fam. Vesp., II, Vesp., 1853, Introd., p. lv.

nest grows very regularly by the addition of new cells to its free extremity. It is never very large, the average number of cells or alveoli being 50 to 60; very seldom a single nest may contain 200 cells or more, but, even then, the construction is not of very great bulk, for these wasps have the curious habit of gnawing away the greater part of the old cells, near the petiole. This old paper is used for new cells at the opposite end of the nest. The material of the nest is a very brittle paper of vegetable fiber; the peduncle and the side parts of the bottom of the nest are much stronger than the walls of the cells.¹

Roubaud has discovered many interesting facts with regard to a tachinid fly, *Roubaudia rufescens* Villeneuve, a common parasite in the nest of *Belonogaster*. The female of this fly is viviparous and lays her young larvæ in or on the wasp nests. As a rule, each young larva burrows into a *Belonogaster* egg or into a very young wasp larva, exceptionally into a more advanced larva. The presence of the parasitic fly larva does not, however, prevent the further development of the wasp larva, which manages to spin its cocoon. But after this, the parasite devours entirely the internal organs of its host and finally leaves the integuments of the wasp larva in order to pupate in the bottom of the cell. At about this time, the adult wasps gnaw away the cap of the cell in order to feed on the remains of the destroyed wasp larva. The opening thus formed is the means of escape for the adult fly, which would otherwise finally die inside of the closed alveolus. These parasitic flies are very noxious to the wasps and often their number increases to such an extent that they bring about the destruction of a colony. A minute chalcid fly of the genus *Paracrias* (Eulophinæ), has been found to infect the *Roubaudia* larva inside the wasp larva; it issues subsequently in large numbers from the pupa of the fly.²

The *Belonogasters* are true social wasps, but their societies are in either a very primitive or else a rather degenerate condition. This is plainly shown by Roubaud's observations. The most interesting fact discovered by him is the probable absence of true workers in the societies of *Belonogaster*: all the females of a same nest are physiologically equal; they can all be fecundated and the ovaries of all of them can produce, sooner or later, mature eggs; differences in size have no relation to the fertility of the individuals. The *Belonogasters* are, therefore, typical *polygynous* wasps. A new nest is, as a rule, started by an isolated female; but very often two or

¹ Some species have an aberrant nidification: such are *B. brevipetiolatus* Saussure, where the cells are placed on a single row, to form a narrow stripe; and *B. hildebrandti* Saussure where the nest is nearly sessile; both these species inhabit Madagascar.

² E. Roubaud.— Evolution et histoire de *Roubaudia rufescens* Villen., Tachinaire parasite des Guêpes sociales d'Afrique, des genres *Icaria* et *Belonogaster*. C. R. Ac. Sc. Paris, CLI, 1910, pp. 956-958.

more females may associate to found a new society, the single female which started the nest being joined by other foreign females at an early period of the construction. More often, however, the new nest originates by a sort of rudimentary swarming, a number of females together leaving an old nest in order to start a new one. Yet in large communities there is a primitive division of work between the different females: some of them, as a rule the older ones, devote themselves chiefly to egg laying, whereas others go out hunting and bring the food in. In these working females the activity of the ovaries may be temporarily reduced, even after copulation has actually taken place. Freshly emerged females stay for the first few days on the nest, where they help the others in feeding the larvæ and otherwise caring for the nest. The males also remain on the nest where they live as true parasites, taking a part of the food brought by the working females. These wasps, so far as observed, make no provision of honey.

As in other social wasps, the larvæ are fed by the females from day to day till they are full-grown. The food consists mostly of masticated insects, chiefly caterpillars, which are presented by the females to the larvæ. At this time the larvæ produce a buccal secretion of which the adult wasps, males as well as females, are very fond. Roubaud goes so far as to believe that in many cases the offering of food to the larvæ by the female is conditioned by the desire of the female to provoke this larval secretion in order to feed on it. He sees in this peculiar symbiotic relation between the adults and the larvæ, which he calls "*æcotrophobiosis*," one of the determining factors in the evolution from solitary to social habits among wasps.

Roubaud believes that the societies of *Belonogaster* show very primitive conditions of social life among the Vespidæ. He considers them to be an important stage in the evolution of social habits among wasps. I must confess that I have still some doubts concerning this. The absence of true workers in the societies of *Belonogaster* may as well point to a degenerate condition of social life; certainly the morphology of these wasps is not primitive, but reveals many degenerate characters, such as the reduction of the number of joints in the antennæ and palpi, and the complete fusion of the different plates of mesopleura and mesosternum.

Key to the Congo Species of *Belonogaster*

Although R. du Buysson considerably reduced the number of species described at his time, the limits between some of the species admitted by this author are still very difficult to appreciate. It seems that further reductions will become necessary. The descriptions in du Buysson's Monograph are very accurate; yet it is to be regretted that this author

has, for a very large part, based his key to the species on the color markings. It may therefore be useful to give, for the Congo species known to me, a key based upon structural characters, as far as this is possible. The males are, as a rule, much better characterized than the females.

Five species were previously recorded from the Belgian Congo: *brunneus* Ritsema, *griseus* (Fabricius), *junceus* (Fabricius), *sævus* Saussure, and *vasseæ* R. du Buysson. To these we may add now: *dubius* Kohl, *lateritius* Gerstæcker, *pusillus* Kohl, and *turbulentus* Kohl.

The following two species were not in the collection on which this paper is based and it was, therefore, impossible to include them in the key:

B. brunneus Ritsema.—Lower Congo: Banana-Loango¹; Lukunga, on the river Lukunga²; Boma.³

B. vasseæ R. du Buysson.—Lufu River.⁴

1. Thorax very distinctly punctate all over, its sculpture becoming coarsely and densely rugose on scutellum and postscutellum; the propodeum transversely striate, distinctly but finely, all over. First abdominal segment (petiole) about as long as the thorax, very gradually thickened from its base to behind its middle, its upper margin forming in profile a continuous, but distinct, curve. Thorax with abundant, erect, black pile, in addition to the appressed tomentum. Hind femora with dense, grayish pubescence beneath; some of the longer hairs blackish. Coloration ferruginous-brown, some parts of the body and legs turning black, especially towards the apex of the abdomen; in the ♂ the face bears two whitish lateral bands descending over the clypeus. Antennæ long and slender; in the ♀, their joints 4, 5, and 6 distinctly longer than broad; in the ♂, the tyloides on the under side very indistinct, the joints 10 and 11 narrow, long, cylindric, the twelfth joint cuneiform, arcuate, with rounded apex. Species of large size. Total length, 25 to 31 mm.

B. sævus Saussure.

Thorax with much finer and more scattered punctuation; the scutellum and postscutellum never rugose; the propodeum at most with a few indistinct striæ on its terminal portion.....2.

2. ♀.—Very slender insect. Temples narrow, not broader than the eyes on the head as seen in profile; the head distinctly narrowed behind the eyes. Oculomalar space comparatively short, much shorter than joints 4 plus 5 of the antennæ. Abdominal petiole (first segment) longer than the thorax, slender and linear in its basal two-thirds, distinctly swollen behind its stigmata. The petiolate portion of the second segment very long. Legs, especially their tarsi, very slender. Punctuation on head and thorax very scarce and minute, nearly obsolete on temples, clypeus, and mesopleura. The whole body pale ferruginous-brown, often with yellow or white spots on the thorax and on the

¹ C. Ritsema, Tijdschr. v. Entom., XVII, 1874, p. 202.

² R. du Buysson, Ann. Soc. entom. France, LXXVIII, 2, 1909, p. 247.

³ W. A. Schulz, Hymenopteren Studien, 1905, p. 15 (*B. distinguendus*).

⁴ R. du Buysson, Ann. Soc. entom. France, LXXVIII, 2, 1909, p. 220.

apex of the clypeus; wings bright ferruginous-yellow, with a slight golden tinge. Small species; total length, 18 to 22 mm. ♂ unknown.

B. turbulentus Kohl.

Of heavier build. The head scarcely, or not, narrowed behind the eyes, the temples being as broad as or broader than the eyes. Oculo-malar space longer; often as long as joints 4 plus 5 of the antennæ. Abdominal petiole never longer than the thorax, as a rule shorter; gradually thickening from its base to behind its middle. Punctuation always distinct on temples, clypeus, and mesopleura. 3.

3. ♀.— Third joint of the flagellum slightly longer than broad; the fourth quadrate, not longer than broad; the following joints rather broader than long. Sides of the face with or without white markings. ♂.— Tyloides on the under side of the flagellum not strongly projecting; the terminal joint of the antennæ long, narrow, falciform. Clypeus pointed at its apex. Coloration of both sexes ferruginous, often darkened on the thorax and the posterior half of the abdomen; the abdomen with or without lateral, pale spots. Wings tinged with ferruginous, often with a slight purplish effulgence. Total length, 20 to 25 mm. *B. lateritius* Gerstæcker.

♀.— Third and fourth joint of the flagellum distinctly longer than broad; the following joints quadrate or even slightly longer than broad. ♂.— Tyloides on the under side of the flagellum strongly projecting; or else species of large size (over 25 mm.) 4.

4. ♀.— A white or yellowish-white longitudinal band on each side of the face, running as a rule from the emargination of the eyes to the apex of the clypeus. Terminal joint of the tarsi often of a brighter color than the other joints. . . . 5.

♀.— No white or yellowish markings on the face. The terminal joint of the tarsi of the same color as the others. In the ♂, the clypeus distinctly pointed towards its apex; the antennæ with tyloides on the under side of joints 5 to 11, those on joints 9, 10, and 11 strongly projecting; the terminal joint of the flagellum long, arcuate, broadly rounded at its apex. 6.

5. Small, but heavily built species, 17 to 23 mm. in total length. Thorax and abdomen very often with white or yellow markings. ♂.— Clypeus broadly rounded at its apex; the tyloides strongly projecting on the under side of the antennal joints 9 to 11. *B. pusillus* Kohl.

Species of large size, 24 to 33 mm. in total length. Thorax and abdomen never spotted with white or yellow. (♂.— Clypeus longer than broad, with projecting apex; tyloides not projecting on the under side of the antennal joints 9 to 11¹) *B. dubius* Kohl.

6. Wings entirely dark fuscous, with strong, purple effulgence. Body rather slender. Temples normal; not swollen behind the eyes. First abdominal segment (petiole) slightly shorter than the thorax; very gradually, but distinctly thickened from its base to behind its stigmata. Coloration mostly black; the head, antennæ, sides of the thorax, legs, and abdominal petiole, partly suffused with ferruginous-brown. In some specimens, there is a cuneiform yellowish-white spot on each side, in front of the hind margin of the

¹ After R. du Buysson, since I have not seen the male of that species.

second tergite. Body covered with grayish pubescence, which is more conspicuous and slightly silvery on the mesonotum. In the ♂, the face has on each side a broad, yellowish-white stripe near the inner margin of the eyes. Total length, 22 to 30 mm. *B. junceus* (Fabricius).
 Wings more or less hyaline, tinged with ferruginous-brown, darker towards their apices. First abdominal segment more slender than in the preceding species, about as long as the thorax. Coloration variable, but as a rule paler, the thorax being ferruginous; very often the abdomen presents a series of lateral, white or yellowish spots on the tergites 2 to 5, those on tergite 2 being much the largest. Pubescence silky, dense, appressed, very distinct on the mesonotum. Total length, 20 to 28 mm. *B. griseus* (Fabricius).

89. *Belonogaster sævus* H. de Saussure

Belgian Congo.—Although widely distributed, this species is always very rare. I have seen ♀ ♀ from Avakubi, October 9, 1909; Bafwabaka, and Medje, January 1914; and 2 ♂ ♂ from Stanleyville, April 1915 (Lang and Chapin Coll.).

90. *Belonogaster turbulentus* Kohl

Belgian Congo.—Three ♀ ♀ from Medje, July and August 1910; 3 ♀ ♀ from Stanleyville, April 1915 (Lang and Chapin Coll.); and 1 ♀ from Lubutu, January 1915 (J. Bequaert Coll.) agree perfectly with the description given by Kohl and R. du Buysson.

The male of this species is unknown. I am inclined to believe that *turbulentus* will prove to be identical with *fliventris* Saussure, a species which has a very wide distribution and differs only by its abdomen being partly black.

91. *Belonogaster pusillus* Kohl

Belgian Congo.—One ♂ and 2 ♀ ♀ from Garamba, July 1912; and one ♀ from Faradje, March 1912 (Lang and Chapin Coll.).

92. *Belonogaster junceus* (Fabricius)

Plate I, Figure 9

This is by far the most common species of the genus in the Belgian Congo, and apparently everywhere in tropical Africa. In the collection of the Congo Expedition there are numerous male and female specimens from Banana, Zambi, Boma, Matadi, Coquilhatville, Lisala, Basoko, Stanleyville, Risimu, Bagboro, Medje, Niangara, and Faradje.

93. *Belonogaster griseus* (Fabricius)

Belgian Congo.—This species is also widely distributed and scarcely less abundant than *B. junceus* (Fabricius). The collection includes ♂♂ and ♀♀ from Banana, Malela, Matadi, Kinshasa, Isangi, Stanleyville, Medje, Batama, Bafwabaka, Niangara, Garamba, Yakuluku, and Faradje. I have seen it in Mt. Ruwenzori as high as 1800 to 2000 m.

94. *Belonogaster dubius* Kohl

Belgian Congo.—I have seen only females from the following localities: Avakubi, Niangara, Faradje, Yakuluku, and Aba (Lang and Chapin Coll.).

Ethology. Plate VI, Figs. 1 and 2 show a nest of *B. dubius* after photographs made by Mr. H. Lang at Faradje, September 1912. This nest was one of a numerous colony, built underneath the thatching of a roof. In order to photograph it, Mr. Lang removed the nest, with the stick on which it was fixed, outside the house; but the wasps all deserted and went back to the former location of the nest; for about seven hours no wasp would visit the nest. It was then put back in its former position, where all the wasps at once would crawl over it. During the night it was again carefully taken away with the wasps all sleeping. The next day only three of the seven occupants were found on it, and one of these left in the morning to go back to the old location, where three others evidently intended to start a new nest. The notes of Mr. Lang say further: "The wasps sit upon the nests during the day and at night, flying off and coming back to feed their young and to raise the cell walls as the larvæ grow. The building of the cells is done by means of the front legs and mandibles. The vegetable fibers are mixed with saliva and kneaded between the mandibles; from time to time the paste is rolled between the front legs. This process goes on till the fiber paste is of a uniform, soft consistency; then the wasp applies the paper to the cells and models it into the right position and shape, going over and over it again with the mandibles. The adults touch the young with their legs, whereupon the latter at once extend their heads to receive food; at the same time they secrete from the mouth a fluid which is absorbed by the adult wasps. The males also stay on the nest; they are often seen grasping a female, the pair dropping off on the ground during their efforts to copulate, both flying afterwards back to the nest."

Mr. Lang was once staying in a house at Faradje, where several hundred nests, some of which attained five inches in diameter, were attached underneath the rafters and thatching of the roof. One night a caravan of driver-

ants (*Dorylus nigricans*) invaded the house; the ants climbed up under the roof and cleared out all the larvæ, pupæ, and eggs from the nests. In the morning, when the ants had left the place, abundant detritus was lying on the floor. This event was apparently a catastrophe for the colony, very few adults returning to start new nests.

95. *Belonogaster lateritius* Gerstæcker

Belgian Congo.— This species is a typical East African form; its occurrence in the northeastern Belgian Congo is therefore noteworthy. I refer to it 19 ♀ ♀ and 1 ♂, all from Garamba, June 1912 (Lang and Chapin Coll.).

Ethology. These Garamba specimens were collected from a nest fixed underneath the thatching of a native hut. Mr. Lang records, however, that a nest of the same species was found in the open savannah.

Polybioides R. du Buysson

This genus has recently been proposed by R. du Buysson¹ for a small number of Old World species which were formerly referred to *Polybia* Lepeletier (= *Myrapetra* White²), the genotype being *Vespa tabida* Fabricius.

A. v. Schulthess³ suggests that the name *Parapolybia* Saussure must supersede *Polybioides* R. du Buysson, but I do not believe this to be true. H. de Saussure⁴ proposed *Parapolybia*, as a division of his genus *Polybia*, to include the three species: *P. indica* Saussure, *P. orientalis* Saussure, and *P. tabida* (Fabricius); the genotype of *Parapolybia* has never been designated. Since R. du Buysson brings *P. tabida* (Fabricius) in his new genus *Polybioides*, one of the two remaining species must be taken as the type of *Parapolybia* Saussure. R. du Buysson's genus *Stelopolybia*⁵ includes both *P. indica* and *P. orientalis*, and is a synonym of *Parapolybia* Saussure; but the identity of *Stelopolybia* R. du Buysson and *Stelopolybia* Ducke is still a matter of dispute.⁶

Polybioides is characterized as follows. Labial palpi 3-jointed and maxillary palpi 5-jointed in both sexes. Antennæ 11-jointed in the female, 12-

¹ Bull. Soc. entom. France, 1913, p. 299.

² *Polybia* Lepeletier, 1836, is preoccupied by *Polybius* Leach, 1816.

³ Zool. Jahrb. Abt. f. Syst., XXXVII, 1914, p. 261, footnote.

⁴ Et. fam. Vesp., II, Vesp., 1853, p. 207.

⁵ Bull. Soc. entom. France, 1913, p. 298.

⁶ Zool. Jahrb. Abt. f. Syst., XXXVI, 1914, p. 329.

jointed in the male. In these characters it agrees with *Belonogaster*; but it is widely different in the structure of the mesopleura, which present distinct sutures subdividing the episterna and separating the epimera. Also, the first abdominal segment, though distinctly petiole-shaped, is much shorter than in most of the species of *Belonogaster*; the second segment does not form a distinct neck at its base.

I know only the Ethiopian species. In these, the clypeus of both sexes ends in a sharply pointed, dentiform apex. The temples are broad and the oculo-malar spaces long: about as long as the third joint of the flagellum in the female; much shorter in the male. The antennæ of the male are elongate and normal; the different joints of the flagellum, as compared with those of the female, merely longer, scarcely more swollen, without tyloides at their under side. Anterior angles of the pronotum broadly rounded. The structure of scutellum, postscutellum, and propodeum is very similar to that found in *Belonogaster*; at the base of the propodeum, the postscutellum is very feebly expanded into a rounded obtuse angle.

Polybioides at present includes four species, two of which are Ethiopian and only found on the African continent; the remaining two species belong to the Oriental region.

Ethology. What was known thus far on the habits of these insects is restricted to a short description of a nest of *P. tabida* by R. du Buysson. The nests of the two African species consist of a small number of combs placed vertically side by side, one of their ends attached to a branch; the whole is enclosed in a thin, brittle paper cover. More details of these interesting constructions and the behavior of their inhabitants may be found further on (pp. 241 and 243).

The pupa, which I have seen preserved in alcohol, of *P. tabida* (Fabricius) is very similar to the adult wasp. Its vertex is flat, without the conical protuberance so characteristic of the pupæ of *Belonogaster*.

Key to the Congo Species of *Polybioides*

A. v. Schulthess and R. du Buysson accept only one species of *Polybioides* for the Ethiopian region. I believe, however, that *P. melaina* Meade Waldo, although closely allied to *P. tabida* (Fabricius), can be separated even on morphological characters. Moreover, the habits of both these forms show many differences.

First abdominal tergite (petiole) longer and more slender; about as long as the thorax and much longer than the second tergite (Fig. 238). Black, with rufous tinges on different parts of the body and legs, and with conspicuous pale yellow markings. Wings nearly hyaline, infusate along their anterior margin only. Length (h. + th. + t. 1 + 2), ♂ and ♀, 8 to 9.5 mm. . . *P. tabida* (Fabricius).

First abdominal tergite comparatively shorter and of heavier build; much shorter than the thorax, and only slightly longer than the second tergite (Fig. 239). Black, scantily marked with whitish-yellow. Wings much darkened, smoky all over. Length (h. + th. + t. 1 + 2), ♀, 8 to 9 mm.

P. melaina (G. Meade Waldo).

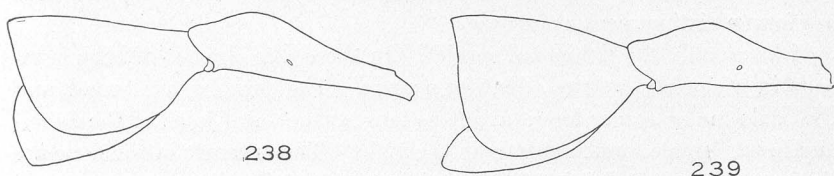


Fig. 238. *Polybioides tabida* (Fabricius), two basal abdominal segments in profile, ♀.

Fig. 239. *Polybioides melaina* (G. Meade Waldo), two basal abdominal segments in profile, ♀.

96. *Polybioides tabida* (Fabricius)

Plate I, Figure 7

♀.—Although the coloration is very variable, I have not seen, in my abundant material, specimens which, as to color, would connect *P. tabida* (Fabricius) with *P. melaina* (Meade Waldo). The females from the Congo all belong to the typical form which may be described as follows: The ground color is not pure black but presents a somewhat brownish tinge which often passes to ferruginous spots on the under side of the thorax, on the legs, etc. The following whitish-yellow parts are very striking: the whole of the clypeus; the under half of the emargination of the eyes; the inner orbits between the basis of the antennæ and the clypeus; the temples; the mandibles partly; the posterior margin of the pronotum; broad margins on the scutellum; the postscutellum; the valvula at the apex of the thorax; a broad spot on the middle and a narrower stripe on each side of the propodeum; an indistinct dot in the upper part of the mesepisterna; a broad basal stripe on the second and third abdominal tergites and the whole of the second sternite; the apical half of the femora; and nearly the entire tibiæ of the front and middle legs. In some specimens the yellowish color invades the entire scutellum, nearly the whole of all the tibiæ and of the front and middle femora, and the base of the first tergite. There may be even a narrow, yellow stripe on the anterior face of the antennal scape. The wings are nearly transparent, feebly smoky, somewhat iridescent; with a dark-brown stigma and a slightly darkened anterior margin, especially in their radial cell.

A. v. Schulthess has described from West Africa a variety *isabellina*, ♀: it is entirely yellow with the exception of the vertex, the posterior face of the head, and the abdomen behind the middle of the second tergite, which are black.

♂.—The male of *P. tabida* has apparently never been described. I have seen three specimens of this sex in the collection of the Bussey Institution at Harvard University.¹ They were collected in Cameroon by Thaxter. In coloration they

¹ I was able to study these specimens thanks to the kindness of Professor C. T. Brues, to whom I wish to express my appreciation for this and many other facilities given to me.

agree almost perfectly with the typical form of the female described above. The yellow of the legs and of the basal segment of the abdomen is slightly more extended, and the ventral face is mostly testaceous. The antennæ show pale brown, somewhat raised, spots on the under side of joints eight to twelve; but these pale swellings are very feeble and cannot be described as tyloides. The last abdominal sternite is normally rounded, scarcely flattened towards its apex, even less so than in the males of *Belonogaster*. Length (h. + th. + t. 1 + 2), 8 mm.

Belgian Congo.—Distributed from the Lower Congo to the Uele district. The collection includes numerous females from Malela, July 1915 (J. Bequaert Coll.), where the species was very abundant in the dense swampy forest along the banks of the Congo River. I have also seen a few females from Medje, April 1914, and one female collected between Bolobo and Lukolela, July 1909 (Lang and Chapin Coll.).

This species is apparently restricted to the forest region of West Africa.

Ethology. All the female specimens of this wasp I have seen are of much the same size. There are no morphological differences between them, and this makes it very probable that this species is polygynous, there being no physiologically differentiated workers. Observations on this point are much needed. New societies of *Polybioides* are probably started through swarming.

The specimens from Medje were taken from a nest which is shown on Plate IV, fig. 2. According to the field notes of Mr. H. Lang, this nest was found in a secondary forest-growth near the station of Medje. It was flattened and elliptic; 108 mm. long and 46 mm. in greatest width; fixed on the stalk of a thorny vine (*Smilax kraussiana*), about 5 feet above the ground and hidden in the dense foliage. Its external cover consisted of a single sheet of very thin, light-gray paper and presented only a single long slit on one side. The two lips of this slit were very close together but in the picture they have been lifted up, in order to show one of the internal combs. On one side of the nest are seen parts of a leaf which was incorporated in the paper cover. Inside were four elliptic combs, fixed by their upper end on the supporting stalk, hanging freely down side by side, and not connected either with each other or with the external paper cover of the nest. The two external of these four combs presented only a single layer of cells opening on the inner side of the comb; but the two central combs, which were larger than the others, had cells on both sides.

It is very interesting to note that these wasps have acquired the habit of utilizing both sides of their combs, thus securing a notable saving of building material and space. This architecture, which is well-known for the honey-bee, is quite exceptional among the Vespidae. The only record of a similar case is, so far as I was able to make out, a nest of the South American *Synæca*

irina Spinola, described by A. Ducke, in which a supplementary comb showed cells on both sides. According to Ducke, this might have been an abnormal architecture, since only a single one-sided comb was found in other nests of the same species.¹

The only previous record on the nesting habits of this species is the description of the nest by R. du Buysson for "*P. bucula* (R. du Buysson)," a name which is a synonym of *P. tabida* (Fabricius).² This nest was found in the Cameroon; it consisted of six elliptic combs fixed side by side on a branch by one of their ends and parallel to each other. Details as to the disposition of the cells are not given. The whole was enclosed in a cover of pale testaceous, extremely thin carton, of very loose texture. The nest was partly hidden by large leaves connected with its external cover by numerous supports. It was 18 cm. long and 9 cm. wide. Although this nest was larger than the one found by Mr. Lang, it was still much smaller than the nests of the following species (*P. melaina*). This difference in size between the nests of both species is, I believe, constant.

97. *Polybioides melaina* (G. Meade Waldo)

♀.—The coloration of *P. melaina* is less variable in the female than that of *P. tabida*. Most of the specimens are nearly entirely black, this color not turning into brownish; as a rule, only the apical half of the clypeus and a small spot on each side of the face near the insertion of the antennæ are white. In a few individuals, the white covers the temples, the narrow hind margin of the pronotum and two narrow longitudinal stripes on the middle of the propodeum. I have seen only one female from Stanleyville in which the white markings are nearly as extended as in some specimens of *P. tabida*, but the short first tergite and the very dusky wings of that specimen leave no doubt as to its identity.

I was unable to study the male of this species. According to G. Meade Waldo, it differs from the female in having the following parts pale testaceous: clypeus totally, except for a median longitudinal streak reaching almost to the apex; mandibles; the inner margin of the eyes (including the lower portion of their emargination); the intermediate coxæ beneath; and the second abdominal sternite.

Belgian Congo.—There are in the collection several hundred specimens from the following localities: Stanleyville, Bafwabaka, Lubila, and Medje (Lang and Chapin Coll.); Walikale and Rutshuru (J. Bequaert Coll.).

This species, too, is found only in the forest regions of tropical Africa, and it is apparently restricted to the very central parts of the continent. It was first described from Mt. Ruwenzori, where, according to personal

¹ See A. Ducke, in Bol. Mus. Goeldi, Para, IV, pt. 4, 1906, pp. 672–673; and V, pt. 1, 1908, p. 164, Pl. 1, figs. 1a and 1b.

² Bull. Soc. entom. France, 1902, p. 253.

observations, it does not reach the temperate mountain zone, not being found above 1500 m. It was also recorded from Rugege (a forest region east of Lake Kivu) and from Mt. Kenia. The present collection shows that it occurs throughout the forest, west of the Great Lakes, as far as Stanleyville and the Uele.

Ethology. Plate v, fig. 1, represents a nest of this species found by Mr. H. Lang near Stanleyville. It was built in a tree about 15 feet above the ground, hanging downwards from a branch, close to the water. It was about one and one-half feet long and 14 inches wide, and was somewhat conical, with its broader, transverse base fixed on the support. The outside cover, which completely encloses the nest, consists of several sheets of paper irregularly adjusted so as to leave between them large spaces serving as entrance galleries to the interior of the nest. These galleries end outwardly in rounded openings, which are extremely numerous and scattered all over the nest. All these openings are directed downwards, the paper cover being placed so as to shelter them from the rain; this gives to the outer surface of the nest an undulated or frilled appearance. At the pointed, lower end the openings are larger and closer together. Plate v, fig. 2, shows the same nest after it had been partly destroyed, only half being left. The structure of the cover can be seen on one of the sides. Of the inner structure it can only be said that several somewhat curved combs hang freely downwards from a rather narrow base fixed on the branch. These combs hang side by side, not being connected with each other, nor with the covering. Apparently in this species too, most of the combs are covered with cells on both sides.

From my own experience, and that of Messrs. Lang and Chapin and of others, it appears that the nests of *Polybioides melaina* are very often fixed on branches of trees which overhang the water. This might, however, merely be due to the fact that they are more easily discovered in that location than when built in the higher trees of the dense forest. They are extremely common along the Aruwimi, Ituri, Itimbiri, and the affluents of these rivers in the forest belt; and they are well-known to everyone who has travelled with canoes in that portion of the Congo basin. This wasp does not seem to occur in the forest gallery of the Uele River.

When compared with their larger relatives, *Polistes* and *Belonogaster*, they would seem to be of little importance as pests; yet their large number, their painful sting, and, above all, their offensive temper make them dreaded by both natives and Europeans. Many of their nests are much larger than that figured and described in this paper, some of them reaching three feet in length; they are densely populated and the numerous, broad entrances described above account for the fact that, when touched or disturbed, the

nest is almost instantly covered all over with angry wasps, ready to dart at the intruder.

The evil reputation of the *Polybioides* was known even to Stanley, the first white man to invade their haunts and to give us a vivid picture of their nests: "These widely spreading trees (on the edge of the Aruwimi River) are favorites with the black wasps, to which they attach their pensile nests. Externally the nests are like fancifully cut brown-paper sacks, or a series of such sacks arranged one above another, with frills and ornate cuttings, like the fancy paper grate-covers in English parlours in summer time. We avoided such trees religiously, and when there was no such terror as a big nest of wasps near, we could rest in comfort and examine the forest at leisure."¹

These wasps are very fond of meat, coming inside houses to steal pieces of it; they feed also on ripe bananas and are often seen on flowers. It is possible that they store honey in some of their cells, although I can give no definite information regarding this.

ROPALIDIINÆ

Ropalidia Guérin-Meneville

(= *Icaria* H. de Saussure)

The replacing of the well-known name *Icaria* by the older *Ropalidia*, is one of those unfortunate changes which are too often a result of the strict appliance of priority rules. In the present case, however, it seems to be inevitable. Guérin-Meneville figured and named *Ropalidia maculiventris* for the first time in the Atlas of Duperrey's 'Voyage de la Coquille,' Zoologie, Insectes, Plate IX, fig. 8. This Atlas was published long before the text was printed and its publication lasted several years. However, there can, I believe, be no doubt as to the date of publication of the plate in question, since that date is given by Guérin himself in the text of Duperrey's 'Voyage de la Coquille,' Zool., II, 2^e p., 1^{ère} div., p. 271, where we learn in the footnote that "Livraison 27" with Plates IX and X of the insects, appeared December 22, 1831.

¹ 'In Darkest Africa.' New York, 1890. Vol. I, pp. 163-164 and Vol. II, p. 84. H. de Saussure supposed that the wasps recorded by Stanley belonged to *Ropalidia* or *Belonogaster* (in Grandidier, Hist. de Madagascar, XX, pt. 1, Hym., 1890, p. 102, footnote); but the presence of a papery cover around the nests excludes at once these two genera. There can be hardly any doubt that the black wasp found by Stanley on the Aruwimi River belonged to *Polybioides melaina* (Meade Waldo), since we have had frequent opportunities to observe these nests in the same location.

The publication of the figure and name of *Ropalidia maculiventris* in the Atlas establishes the genus in due form; hence it is obvious that Lepeletier de St. Fargeau's generic name *Rhopalidia* (1836)¹ can make no claim to priority. It is well known that *Rhopalidia* Lepeletier and *Ropalidia* Guérin include completely different insects,² although Guérin believed them to be the same and in the text of Duperrey's work quotes Lepeletier as the author of the genus.³ It is probable that Guérin was misled by the similitude of names and that Lepeletier de St. Fargeau did not know of the earlier *Ropalidia* Guérin.

H. de Saussure⁴ recognized the differences between Guérin's and Lepeletier's genera and, deceived by Guérin's own statements, he proposed the new name *Icaria* for *Rhopalidia* Guérin, 1838. However, *Icaria* H. de Saussure, 1853, and *Ropalidia* Guérin, 1831, are exactly synonymous, both having the same species, *maculiventris* Guérin, 1831, as genotype.

Dalla Torre⁵ quotes: "*Rhopalidia* Guérin, Duperrey, Voy. Coquille, Zool., II, 2, 1830, p. 265 (nec Lep.)" as a synonym of *Icaria*; but the date, 1830, is certainly wrong; the error may have originated from the title-page of Duperrey's work, which on Tome second, 2^e partie, shows as date of publication the year 1830. However, it is certain that the text was printed much later; probably its publication lasted several years. It seems impossible to decide the precise date of issue of the pages containing the description of "*Rhopalidia maculiventris*"; so much is sure that it was after 1836, since Guérin quotes Lepeletier's book published that year. The "Avant-propos" to the "Tome second, 2^e partie" was written by Guérin-Menéville and dated 1838, which year may perhaps be accepted as the most probable date of publication of the description of *Rh. maculiventris*.⁶ The whole question is of little importance, since we know with precision that *Ropalidia maculiventris* Guérin was figured and named in the Atlas in 1831.

The morphological characters of the genus *Ropalidia* Guérin are as follows:

Antennæ 12-jointed in the female; 13-jointed in the male. Labial palpi 4-jointed; maxillary palpi 6-jointed. Eyes bare or covered with scattered, short, erect hairs. No median episternal groove on the mesopleura, the episternum not being divided into an upper and a lower plate; the mesopleural suture delimiting

¹ Hist. nat. Ins. Hym., I, p. 538.

² *Rhopalidia* Lepeletier de St. Fargeau, 1836 is a synonym of *Gymnopolybia* A. Ducke, Zool. Jahrb. Abt. f. Syst., XXXVI, 1914, pp. 317 and 327.

³ Duperrey, 'Voyage de la Coquille,' Zoologie, II, 2^e partie, 1^{ère} division, 1838, p. 266.

⁴ Et. fam. Vesp., II, Vesp., 1853, p. 22.

⁵ Cat., IX, Vesp., 1894, p. 117.

⁶ According to W. A. Schulz (Berliner entom. Zeitschr., LVII, 1912, p. 60), *Rhopalidia* Guérin dates from 1839.

the epimerum also indistinct or absent. The shape and structure of the second segment of the abdomen are very peculiar, and I have not found anything similar in another genus of Vespidae: its tergite and sternite are completely or almost completely fused; very often there is no trace of suture left; or there may be an indication of a suture on one or on both sides of the segment, throughout its length or at its base only, this being somewhat variable in different specimens of the same species. This fusion of tergite and sternite gives to the second segment the shape of a more or less elongated bell, inside which the much narrower and shorter posterior segments can partly or nearly entirely be telescoped. First abdominal segment much narrower than the second; more or less petiolate at its base; curved and swollen in its apical portion.

About 130 species have been described, but it will be difficult to hold these numerous names on morphological characters. The color markings are without any value in this genus, being as variable as in *Polistes*. H. de Saussure¹ has proposed to divide these numerous forms into three groups, which have been named by Dalla Torre²; G. Meade Waldo³ raising them even to subgeneric rank. They are chiefly based on the shape of the abdomen:

1. *Icaria* Saussure, *sensu stricto* (= *Icariastrum* Dalla Torre).—Facies of certain species of "*Polybia*," in the sense of H. de Saussure, 1853; such species are *Protonectarina sylveibæ* (Saussure) and *Myrapetra sericea* (Olivier). Second abdominal segment broad, short, flattened, broader than long. Petiole flattened or cupuliform at its apex. Head flattened and broad. Type: *Ropalidia maculiventris* Guérin. All the species of this group belong to the Oriental and Australian regions.

2. *Icarielia* Dalla Torre.—Petiole campanulate or linear; the second abdominal segment nearly vertically truncate or cut obliquely from behind towards its anterior part. The type is *Icaria flavopicta* Smith, from Borneo. These species belong mostly to the Oriental and Australian regions; but H. de Saussure includes in this group *Icaria phalansterica* Saussure, from Madagascar.

3. *Icariola* Dalla Torre (= *Icaria*, *proprie dicta*, H. de Saussure).—Second abdominal segment longer than broad, of the shape of a cylindric bell, obliquely or vertically truncate from behind towards its anterior part; the third segment strongly retracted within the second. Head of heavy build, not broader than the thorax. Petiole ending in a nodular swelling. The type is *Icaria gregaria* Saussure. This group includes most of the Ethiopian species, and some others from the Oriental and Australian regions.

I cannot believe that these three groups, as they were characterized by

¹ Stettiner entom. Zeitg., XXIII, 1862, pp. 132-133.

² Genera Insectorum, Vespidae, 1904, p. 72.

³ Ann. Mag. Nat. Hist., (8), XI, 1913, p. 46.

H. de Saussure, can claim subgeneric rank, because there are intermediate forms in every direction. The shape of the second segment is apparently somewhat variable among the individuals of the same species, taken from a single nest; it depends largely on the more or less complete fusion of its tergite and sternite.

The species of *Ropalidia* may perhaps form three natural divisions as follows:

1. First abdominal segment shortly pedunculate; broadened and gradually rounded towards its apex, which has about the half of the width of the second segment. Second segment short and bell-shaped, about as broad as long; the third and following segments only slightly narrowed and only partly retractile within the second. Mesopleura without raised vertical carina in their anterior part. This group may be called *Ropalidia* Guérin, *sensu stricto*, its type being *R. maculiventris* Guérin, of which I have seen one female; *Icaria australis* Saussure is very probably a synonym of that species.

2. First abdominal segment shortly, or very distinctly, pedunculate; narrowed and swollen; more or less club-shaped at its apex, which has at most one-third of the width of the second segment. Second segment elongate and bell-shaped, with more or less parallel sides; as a rule longer than broad.

- a) Mesopleura without raised vertical carina in their anterior part. Type: *Icaria socialistica* Saussure. In this division come all the Malagasy species known to me: *R. atra* (Saussure), *R. hova* (Saussure), *R. phalansterica* (Saussure), *R. grandidieri* (Saussure), and *R. anarchica* (Saussure). Furthermore, the Australian species: *R. socialistica* (Saussure) and *R. cabeti* (Saussure). It is probable that *R. flavopicta* (Smith) also belongs here, so that the name *Icarielia* Dalla Torre might perhaps be used for this group, if we accept it as a subgenus.

- b) Mesopleura with a raised vertical carina in their anterior part. This carina can become more or less obsolete, according to the state of preservation of the specimens. Type: *Epipona cincta* Lepeletier. The group includes, among the Ethiopian species: *R. cincta* (Lepeletier), *R. guttatipennis* (Saussure), and *R. ambigua* (Gribodo). It also includes the following forms from the Oriental region: *R. artifex* (Saussure), *R. ferruginea* (Saussure), and *R. variegata* (Smith).

Other useful characters to separate the species are afforded by the size of the temples and oculo-malar space, by the shape of the thorax, by the sculpture of the scutellum and propodeum, by the shape of the first abdominal segment; and by the antennæ in both sexes. The shape of the first

abdominal segment (petiole) has been very thoroughly studied for the Malagasy species by H. de Saussure¹: however, it seems that this character does not allow a natural division of the genus, as the extreme forms are in every direction connected with each other. The shape of the terminal margin of the second segment is apparently of little value, showing often much variability in specimens taken from a single nest.

Ropalidia is restricted to the Old World and only found in the Ethiopian, Oriental, and Australian regions (Fig. 240). Forty-one species have been recorded from the Ethiopian region, a number which is doubtless too high. Of these, 29 are only found in the Malagasy subregion. The abundance of *Ropalidia* on Madagascar and the leaf-green color markings peculiar to certain of the Malagasy species,² are among the chief features of the wasp fauna of that island. The remaining 12 species are found on the African continent, south of the tropic of Cancer and in Southern Arabia; however, since most of them are very imperfectly known, it is impossible to divide them further into East and West African forms. In the mountains of Central Africa they are found as high as 2000 m.

Ethology. The nest of *Ropalidia* was known to H. de Saussure, who described and figured it for several Oriental species.³ It is composed of a single horizontal or convex comb of hexagonal paper cells, not enclosed in a cover; the nest hangs from a roof, a branch, or a leaf, the opening of the cells being directed downward. The pedicel is situated either in the center or at one of the extremities of the comb. The comb itself may be very long and narrow, or broader, oval; in the latter case, which is more frequent on the African continent, the nest is very similar to that of *Polistes*.

The nest of the African *R. guttatipennis* (Saussure) has been described by F. Smith,⁴ and a few details of the life history of *R. cincta* (Lepelletier) and *R. guttatipennis* (Saussure) have been recently given by Roubaud.⁵ All the cells of a nest are of the same size and shape; the colonies are, as a rule, more numerous than in *Polistes* and the nest may consist of several hundred cells. Associations of females in order to start a new nest have been observed; still, there is a differentiation between sterile females (workers) and fertile females (queens), as was found after an anatomical study of the ovaries. There are always a number of fertile females on the same nest, so that the societies of *Ropalidia* are still polygynous, though presenting

¹ In Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 111-115.

² Several of the Malagasy *Belonogaster* present also leaf-green color markings (*B. prasinus* Saussure, *B. apicalis* Saussure, etc.).

³ Et. fam. Vesp., II, Vesp., 1853, pp. LXI and 26; Pl. iv, fig. 3a; Stettin. ent. Zeitg., XXIII, 1862, p. 139.

⁴ Trans. Ent. Soc. London, (2), III, 1856, Proc., p. 129.

⁵ Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 139-141.

less primitive conditions than the communities of *Belonogaster*. The larvæ are fed after the manner of *Belonogaster* with animal food, mostly with mal-axated caterpillars. Storing of honey in the cells has not been observed.

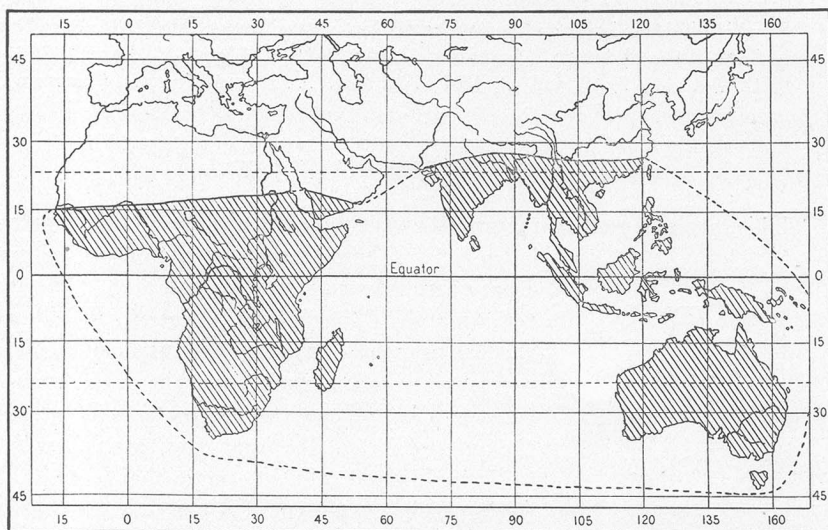


Fig. 240. Distribution of the genus *Ropalidia*.

Key to the Congo Species of *Ropalidia*

Only one species, *R. cincta* (Lepeletier), had been hitherto recorded from the Belgian Congo. Besides this very common wasp, the collection contains also specimens of *R. capensis* (Saussure) and *R. guttatipennis* (Saussure). These three species may be separated as follows:

1. First abdominal segment short and swollen; its petiolate base scarcely distinct (Fig. 242). Thorax elongate, more than one and one-half times as long as broad, as seen from above. Scutellum without raised median anterior carina; with a shallow longitudinal furrow on its middle. Propodeum without any trace of longitudinal ridges or posterior projecting angles; its sides rounded and convex. Antennæ short; clavate (Fig. 241). Posterior ocelli scarcely more distant from the inner margin of the eyes than from each other. Length (h. + th. + t. 1 + 2), ♀, 7.5 mm. *R. capensis* (Saussure).
- First abdominal segment more elongate and slender; with a very distinct, basal petiole (Figs. 243 and 246). Thorax only slightly longer than broad as seen from above; the swollen mesopleura, as a rule, visible from above at the sides of the tegulæ. Scutellum with a more or less distinct, raised, median carina. Antennæ more elongate. Posterior ocelli distinctly nearer to each other than to the inner margin of the eyes. 2.

2. Excavation of the propodeum (Fig. 246) shallow; bordered by rounded ridges, which do not project as sharp angles above the insertion of the abdomen. Antennæ, ♀, Fig. 247; ♂, Fig. 248. Length (h. + th. + t. 1 + 2) ♀ and ♂, 8.5 to 11 mm.....*R. cincta* (Lepeletier).
Excavation of the propodeum deep; bordered by strong, subcarinate ridges, which in their lower end project as distinct obtuse angles (Fig. 243) above the base of the abdomen. Antennæ, ♀, Fig. 244; ♂, Fig. 245. Length (h. + th. + t. 1 + 2) ♀ and ♂, 10.5 to 12 mm.....*R. guttatipennis* (Saussure).

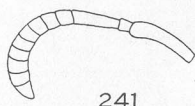
98. *Ropalidia capensis* (Saussure)

This species is well characterized by the morphological peculiarities given in the key. The coloration of the only specimen I have seen is ferruginous-black all over. The anterior margin of the clypeus, a spot on each side of the face near the insertion of the antennæ, the narrow anterior carina-shaped margin of the pronotum, two lateral spots on the postscutellum, and the anterior face of the front coxæ, are yellow.

It is, I believe, almost certain that *R. ambigua* (Gribodo) is a synonym of *R. capensis* (Saussure).

Belgian Congo.—A single female from Boma, June 15, 1915 (Lang and Chapin Coll.).

The nest of *R. ambigua* (Gribodo) has been described by R. du Buysson.¹ It is apparently always small.



241



242

Figs. 241–242. *Ropalidia capensis* (Saussure).

Fig. 241. Antenna, ♀. Fig. 242. First abdominal segment in profile, ♀.

99. *Ropalidia guttatipennis* (H. de Saussure)

Plate I, Figure 11

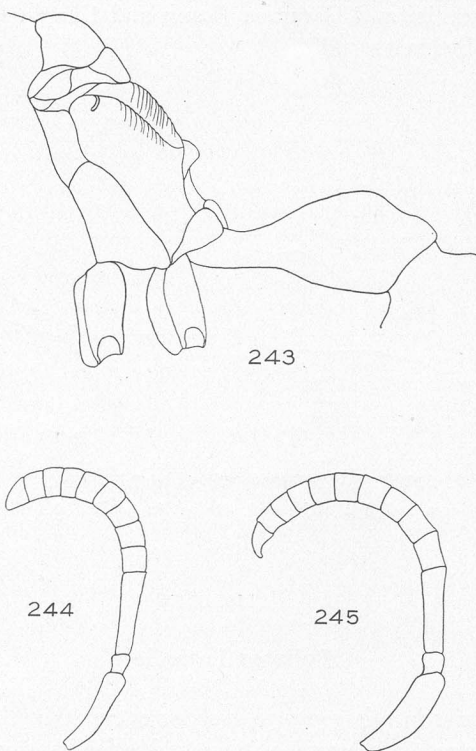
This species is very closely related to *R. cincta* (Lepeletier), the only differences being those given in the key; the coloration is, of course, very variable. *R. politica* (Saussure) is merely a color variation of this species, and I am inclined to believe that *R. nobilis* (Gerstæcker) and *R. brazzai* (R. du Buysson) are also synonyms of it. The longitudinal carinæ on the propodeum are more or less marked, and the same is true for its projecting posterior angles. It is sometimes hard to decide whether a female belongs either to *cincta* or to *guttatipennis*; but the males are easily recognized by the shape of the antennæ.

Belgian Congo.—Apparently not very common. I have seen specimens

¹ Voyage Alluaud et Jeannel Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, pp. 155–156.

only from Stanleyville, April 1915 (9 ♀♀, 9 ♂♂); Malela, July 1915 (1 ♀); and Katala (1 ♀) (Lang and Chapin Coll.).

R. guttatipennis is known all over the Ethiopian part of the African conti-



Figs. 243-245. *Ropalidia guttatipennis* (Saussure).

Fig. 243. Propodeum and first abdominal segment in profile, ♀. Fig. 244. Antenna, ♀. Fig. 245. Antenna, ♂.

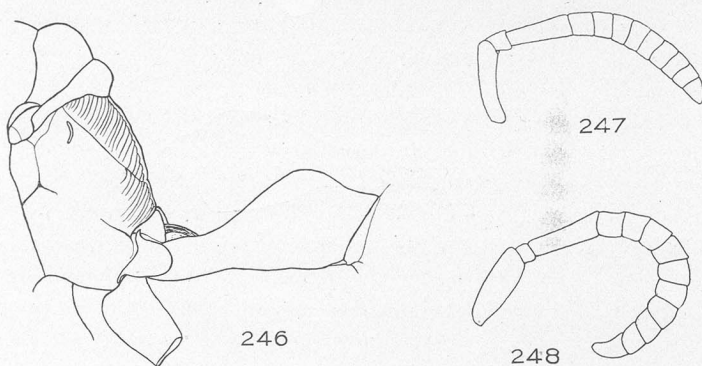
nent, and is said to occur also in the Oriental region. However, I believe that it was often confused with *R. cincta* Lepeletier, which is much more common in Africa.

100. *Ropalidia cincta* (Lepeletier)

I. tricinctella Gribodo is certainly a synonym of *R. cincta*; the characters given by Gribodo for his species have hardly any value. The carina on the scutellum is said to be very fine, but this is somewhat variable among speci-

mens taken on the same nest; and the obsolete carinae of the propodeum are characteristic for *cincta*.

Belgian Congo.—One of the most common wasps. I have seen several hundred females and males from Banana, Zambi, Boma, Matadi, Thysville, Stanleyville, Faradje, and Garamba (Lang and Chapin Coll.); Walikale and Bogoro (J. Bequaert Coll.).



Figs. 246-248. *Ropalidia cincta* (Lepeletier).

Fig. 246. Propodeum and first abdominal segment in profile, ♀. Fig. 247. Antenna, ♀. Fig. 248. Antenna, ♂.

POLISTINÆ

Polistes Latreille

The color varies in this genus to such an extent that the markings presented by a specimen are almost without value for its exact identification. Since most of the species have been described on the color alone, there is an abundance of names; whereas the really distinct species are apparently not very numerous. In South America, e. g., Ducke does not recognize more than 19 species.¹ It will therefore be well to show that there are many valuable morphological characters which, when thoroughly studied, will enable us to separate the species and to arrange them according to their natural affinities.

Various attempts to divide the genus *Polistes* into natural groups have not been successful so far. H. de Saussure attached much importance to the general shape of the abdomen, bringing the species in three groups according to this character.²

¹ Bol. Mus. Paraense, V, 1, 1908, pp. 190-198.

² Note sur les *Polistes* américains. Ann. Soc. entom. France, (3), V. 1857, pp. 309-314.

1. Abdomen slender, distinctly fusiform, very conical; its first segment elongate, its apical segments compressed. The abdomen as a whole not depressed. The propodeum conical, rather elongate. Type: *P. canadensis* (Linné).

2. Abdomen of intermediate shape, rather depressed, though compressed towards its apex. Type: *P. carnifex* (Fabricius).

3. Abdomen more oval, less conical, not at all compressed, as a rule slightly curved towards its under side; first segment rather ampulliform; the abdomen as a whole being depressed. Propodeum more flattened, less elongate behind. Type: *P. fuscatus* (Fabricius).

None of the subsequent writers have followed H. de Saussure in this direction. There is evidently a marked difference in the shape of the abdomen between such extremes as *P. canadensis* (Linné) and *P. fuscatus* (Fabricius); but, as pointed out by J. Bréthes,¹ there are numerous transitions. Moreover, the shape of the abdomen often depends upon the state of preservation of the specimens. The shape of the first abdominal segment affords a hardly more reliable character; in some species such as the genotype, *P. gallicus* (Linné), it is short and somewhat bell-shaped; as seen from above, its swollen part is distinctly broader at its apex than long; in profile, it raises abruptly from its basal, short pedicel. In others, such as *P. canadensis* (Linné), this first segment is elongate, about as long as broad at its apex and is gradually swollen behind its short peduncle-like base.² But for this, again, there are many transitional forms.

J. Bréthes³ and A. Ducke⁴ have called attention to the different structure of the mesopleura in *Polistes*, which affords very useful specific characters. If we consider the thorax of the type species,⁵ *P. gallicus* (Linné), in profile (Fig. 249) we find in the upper part of the mesopleura a vertical median suture (*ab*), which bifurcates above its middle, sending a branch to the front (*bc*) and another to the hind margin (*bd*) of the pleurum. Among the three plates thus separated on the mesopleurum, the upper hind-plate (between the hind margin and the *mesopleural suture*, *abd*) is the *epimerum* (*em*) of the mesothorax; the rest of the mesopleurum represents the *episternum* divided by a *median episternal groove* (*bc*) in an upper (*es1*) and a lower (*es2*) episternal plate. The lower episternal plate is not separated by a distinct sternopleural suture from the mesosternum; only on its

¹ An. Mus. Nac. Buenos Aires, (3), II, 1903, p. 17.

² An extreme in this direction is *P. subsericeus* Saussure.

³ An. Mus. Nac. Buenos Aires, (3), II, 1903, pp. 17-27.

⁴ Bol. Mus. Paraense, IV, fasc. 2-3, 1904, pp. 364-372.

⁵ For the nomenclature of the different parts of the mesopleura, I have followed R. E. Snodgrass. The Thorax of the Hymenoptera. Proc. U. S. Nat. Museum, XXXIX, No. 1774, 1910, pp. 37-91. 16 pls.

anterior part can we discover a very slight and short longitudinal depressed line (*e*); this depressed line is present, not only in all the species of *Polistes*, but also in most, if not all, of the Vespidae¹ and it probably represents the sternopleural suture which is still found between mesosternum and mesopleurum in many of the Tenthredinoidea. We find, furthermore, on the anterior part of the lower episternal plate a more or less distinct ridge (*fg*) often bordered by a suture, running almost vertically from the mesosternum to near the median episternal groove. This vertical ridge may be called the *prepectal suture*, since it delimits on the anterior face of the mesopleura a

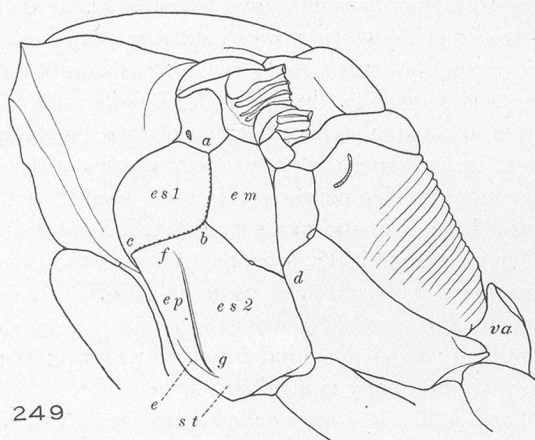


Fig. 249. *Polistes gallicus* (Linné), thorax, ♀, in profile: *abd*, mesopleural suture; *bc*, median episternal groove; *e*, depressed line representing the sternopleural suture; *fg*, prepectal or epicnemial suture; *st*, mesosternum; *es 1*, upper and *es 2*, lower plate of the mesepisternum; *em*, mesepimerum; *ep*, prepectus or epicnemium; *va*, valvula.

prepectus (Snodgrass) or *epicnemium* (C. G. Thomson; F. Kohl): this is a more or less pronounced depression in which the femora of the front legs can be folded at rest (*ep*).

There is much variation within the limits of the genus *Polistes* as regards the relative development of the sutures on the mesopleura. The following combinations may be found:

1. Type of *P. gallicus* (Linné), as described above (Fig. 249): Mesopleural suture, median episternal groove, and prepectal suture all well developed. Numerous species, distributed all over the world, come in this group.
2. Type of *P. canadensis* (Linné): Mesopleural suture and median

¹ This line is very often obsolete in poorly preserved specimens.

episternal groove distinct. No prepectal suture in front of the mesepisternum. Most of the Nearctic and some of the Neotropical species belong in this group.

3. Type of *P. bicolor* Lepeletier: Prepectal suture distinct. Mesopleural suture more or less complete, separating the epimerum from the mesepisternum. No median episternal groove dividing the mesepisternum into two parts. This group includes numerous species of the Neotropical and Oriental regions.

4. Type of *P. madecassus* Saussure: No prepectal suture and no median episternal groove. The mesopleural suture may be more or less complete or become obsolete. In this group belong many Ethiopian and Oriental species and most of those inhabiting the Malagasy subregion.

Gyrostoma schach (Fabricius) (= *Polistes gyrostoma* Saussure, *Gyrostoma orientalis* Kirby) differs from all other species of *Polistes* in having no median episternal groove dividing the mesepisternum into two plates, whereas the prepectal suture of the mesepisternum is strongly marked. This species presents many other morphological peculiarities, so that it is sufficiently isolated from the other *Polistes* to regard it as the type of a distinct genus.

The same cannot be said for the other groups of *Polistes* which have been proposed and named either as subgenera or as genera. Cameron's genus *Polistratus*,¹ e. g., is very doubtful; the type species may be a *Ropalidia* or *Parapolybia* or even a solitary wasp. *Polistella* Ashmead,² based on a single species, *Polistes manillensis* Saussure, is very unsatisfactorily characterized. A smooth, not transversely striate propodeum is given as its chief character; but this is found in many species of *Polistes*, even in South America.³ The venation of the wings is hardly of any value among Vespidæ. The best characters of *Polistella* seem to be the shape of the first abdominal segment, the short oculo-malar space, and its very small size.

Dalla Torre⁴ has introduced two new denominations for the groups distinguished by H. de Saussure in his Monograph (1853), merely translating the characters given by this author. *Eupolistes* Dalla Torre corresponds to the "Première division" of de Saussure (*op. cit.*, p. 45, including with a single exception all the species known to him at that time). *Polistoides* Dalla Torre⁵ is the "Seconde division" of de Saussure (*op. cit.*, p. 100), with one species *P. subsericeus* Saussure. These divisions were based on

¹ Nova Guinea, V, Zool., 1, 1906, p. 59.

² Proc. U. S. Nat. Mus., XXVIII, No. 1387, 1904, p. 133.

³ G. Meade Waldo, Ann. Mag. Nat. Hist., (8), VII, 1911, p. 102, says that *Polistes flavobilineata* (Cameron) (= *Icaria flavobilineata* Cameron, 1902) is very closely related to *P. manillensis* Saussure: "both species have the median segment only indistinctly transversely striate on the posterior slope."

⁴ Genera Insectorum, Vespidæ, 1904, p. 68.

⁵ This name is preoccupied by *Polistoides* Loew, 1873.

the shape of the abdomen, which is apparently too variable to be of any use in bringing the species into natural groups.

R. du Buysson¹ has discovered an excellent character presented by some species in the strongly asymmetric tarsal claws of the middle and hind legs, the internal claw being much longer and more heavily built. The species in which this has been found hitherto are: *P. madecassus* Saussure, *P. fastidiosus* Saussure with its var. *sikoræ* (Saussure), and *P. aquilinus* R. de Buysson; they all belong to the Ethiopian region, including the Malagasy subregion, and apparently form a well defined group, which may perhaps claim subgeneric rank. In these three species the terminal tarsal joint of the hind legs is very long and distinctly curved downwards; seen from above, this joint is as long as, or even longer than, the preceding two together; this results from the penultimate joint being shortened on its middle part and deeply bifid at its apex, with very long lateral lobes. The mesopleura present the simplified structure described above for *P. madecassus* Saussure. The propodeum is very strongly, transversely striate. First abdominal segment short; bell-shaped; of the type of *P. gallicus* (Linné).—In the male, the clypeus is truncate; straight along its anterior margin. The antennal joints are cylindrical; elongate; with strongly projecting tyloides beneath. Terminal sternite with a broad oval, median, somewhat discolored depression.

The following structural characters may also be used to separate the species of *Polistes*, chiefly in the males²: The development of the temples and of the oculo-malar space; the shape of the clypeus, especially of its anterior margin; the relative distance between the eyes on vertex and clypeus; the shape of the antennæ, especially the form of their apical joint in the male, and the relative length of their joints in both sexes; the sculpture of the thorax, especially of the propodeum, which may be more or less depressed on its middle line; and the shape of the terminal sternite and of the male genitalia.

The genus *Polistes* is distributed all over the world, going as far north as Southern Scandinavia and Canada. Of the 20 species which have been described from the Ethiopian region, 7 are found in the Malagasy subregion, one of these being a local race of a species from the African continent and another being widely distributed throughout the Oriental region; 4 are restricted to West Africa; 6 were recorded only from East and South Africa; and 4 are apparently distributed over the whole continental part of the Ethiopian region.

Ethology. The nesting habits of *Polistes* are well known and are much

¹ Bull. Soc. entom. France, 1895, p. 256.

² F. Kohl, Ann. naturh. Hofmus. Wien, XIII, 1898, pp. 87-90; Denkschr. k. Akad. Wiss. Wien, math. naturw. Kl., LXXXI, 1908, p. 311.

the same for all the species. The nest is a single horizontal comb of hexagonal paper cells, fixed on the support by a pedicel which, as a rule, has a central situation. In a few species the pedicel is always eccentric. The cells usually open downwards, although in a well sheltered place they may open upwards. The comb is never enclosed in a cover.

The societies of *Polistes* last, as a rule, only a few months; they are apparently never perennial. The new nest may be, even in tropical countries, started by a single fecundated female or queen; however, it has been repeatedly observed that several females associate to build a new nest: for *P. gallicus* (Linné) by P. Marchal¹ and Fertou²; for *P. versicolor* (Fabricius) by H. v. Ihering.³ Besides, it is very difficult to make a distinction between females and workers, for they can apparently all become fertile.⁴ This genus forms a link between the true monogynous (*Vespa*) and the polygynous, swarming wasps (*Apoica*, *Caba*, *Chartergus*, etc.). True swarming has not been observed in *Polistes*.

Polistes feeds its larvæ chiefly with animal food (malaxated insects, etc.). All the species probably store in their cells, at least under certain conditions, small provisions of honey. This has been first recorded for *P. gallicus* (Linné) by Lepeletier.⁵ and later for the same species by Rouget⁶ and P. Marchal (*loc. cit.*, 1896). Honey has also been found in the cells of *P. americanus* (Fabricius) from Lower California⁷ and *P. metricus* Say from the Eastern United States.⁸

Key to the Congo Species of *Polistes*

Only the following three species of *Polistes* were formerly known to occur in the Belgian Congo: *P. marginalis* (Fabricius), *P. smithii* Saussure, and *P. spilophorus* Schletterer. Besides these I have now seen from the same region specimens of *P. aquilinus* R. du Buysson, *P. haugi* R. du Buysson, *P. fastidiosus* Saussure, and also a species which is apparently new and will be described as *P. macrocephalus*.

1. Tarsal claws of the middle and hind legs asymmetrical, the internal claw much longer and heavier than the external one; for other characters of this group, see p. 256. (Group of *P. madecassus* Saussure) 2.
- Tarsal claws symmetrical, the internal and external ones nearly alike 3.

¹ Bull. Soc. zoolog. France, XXI, 1896, pp. 15-21.

² Ann. Soc. ent. France, LXX, 1901, 1, p. 128.

³ Zoolog. Anzeiger, XIX, 1896, pp. 449-453.

⁴ Parthenogenesis in *Polistes* has been studied by v. Siebold. Beiträge zur Parthenogenesis der Arthropoden, Leipzig, 1871; Ueber Parthenogenesis bei *Polistes gallica*, Munich, 1869.

⁵ Hist. nat. Ins. Hymén., I, 1836, p. 496.

⁶ Mém. Ac. Dijon, 1872-1873, p. 37.

⁷ Ch. Brongniart, in Bull. Muséum Paris, I, 1895, pp. 37-38.

⁸ Wm. M. Wheeler, American Journ. Psychology, XIX, 1908, p. 5.

2. Claws of the hind tarsi very strongly asymmetrical, the internal claw nearly twice as long as the external; the apical tarsal joint strongly curved (Fig. 252). Punctuation of head and thorax strong and dense, the mesonotum distinctly rugose. Clypeus convexly swollen, with a few strong punctures scattered all over. Shape of head, ♀: Fig. 250; of basal joints of antennæ, ♀: Fig. 251; of antennæ, ♂: Fig. 254. Black-brown wasp; with a few ferruginous-red spots on head, thorax, and legs; small yellow markings on the thorax, and terminal yellow bands on tergites one or one and three. Tarsi of all the legs black; the terminal joint of the front tarsi with a yellowish-brown spot. Spurs of the hind tibiæ brown. Length (h. + th. + t. 1 + 2), ♀ and ♂, 11.5 to 13 mm.....*P. aquilinus* R. du Buysson.
Claws of the hind tarsi less asymmetrical, the internal claw only one-third longer than the external; the apical tarsal joint slightly curved (Fig. 256). Punctuation of head and thorax more remote and fine, especially on the mesonotum which is feebly granulate. Clypeus scarcely convex; with a very few scattered punctures on its smooth terminal part; its basal portion covered with a fine and dense, irregular striation. Shape of head, ♀: Fig. 255; of basal joints of antennæ, ♀: Fig. 257. Reddish-brown species; with conspicuous ivory-yellow markings on head, thorax, and abdomen; the abdomen with broad terminal bands on all its tergites and sternites. Tarsi of all the legs pale, ferruginous or yellowish, their terminal joint of the same color; spurs of the hind tibiæ ferruginous or yellowish-brown. Length (h. + th. + t. 1 + 2), ♀ and ♂, 13 to 15 mm.....*P. fastidiosus* Saussure.
3. Mesopleura with a prepectal suture in their anterior part¹; their surface divided into three plates by a mesopleural suture and a median episternal groove (Type of *P. gallicus*, Fig. 249).....4.
Mesopleura without prepectal suture; the mesopleural suture more or less complete; the median episternal groove wanting. Head normal. Antennæ of the ♂ elongate; the joints of the flagellum not flattened, nor spirally rolled up.....6.
4. ♀.—Head (Fig. 260) long and broad, distinctly broader than the thorax; the temples strongly developed, swollen; the hind margin of the vertex much more remote from the posterior ocelli than the ocelli are from the eyes. Propodeum without transverse striation. Length (h. + th. + t. 1 + 2), 10 mm. ♂ unknown.....*P. macrocephalus*, new species.
Head normal, not broader than the thorax; temples moderately developed; the hind margin of the vertex about as far from the posterior ocelli as the ocelli are from the eyes. Propodeum with distinct transverse striæ. Antennæ in the ♂ spirally rolled up towards their extremity; the terminal joints of the flagellum flattened and excavated on their under side.....5.
5. Medium-sized species. Length (h. + th. + t. 1 + 2), ♀ and ♂, 8 to 12 mm. Antennæ, ♀, relatively heavy, their third joint as a rule shorter than the first (scape) and at most three times as long as the fourth (Fig. 265); in the ♂, the scape (first joint) distinctly shorter and scarcely thicker than the third joint (Fig. 263). Coloration very variable, from deep black to ferruginous-red, with more or less extensive, yellow markings. Wings more or less tinged with golden-yellow.....*P. marginalis* Fabricius.

¹ The prepectal suture may become obsolete and difficult to discover in badly preserved specimens.

Smaller species. Length (h. + th. + t. 1 + 2), ♀ and ♂, 7 to 8 mm. Antennæ, ♀, slender, their third joint scarcely shorter than the first (scape), at least three times as long as the fourth joint (Fig. 267); in the ♂ the scape is as long as the third joint and distinctly thicker (Fig. 266). Coloration chiefly black; the body covered with a brownish, somewhat rusty bloom; head of the ♀ partly ferruginous. The following markings are ivory-yellow: apical margin of clypeus; inferior part of inner orbits; anterior margin of pronotum; two longitudinal stripes on propodeum; valvula of the thorax; and an apical band on tergites one or one and two; in the ♂ also the larger part of the legs, the face, and the under side of the antennæ. Wings subhyaline, without golden tinge, with a smoky spot in their radial cell. .*P. spilophorus* Schletterer.

6. Medium-sized species. Length (h. + th. + t. 1 + 2): ♀, 11 to 12 mm.; ♂, 11 mm. Color almost uniformly pale brown, with very few ivory-white markings. The whole of the body covered with a silvery bloom, and, furthermore, with an abundant short, golden, erect pile, especially striking on the abdomen. Posterior ocelli, ♀ and ♂, scarcely one and one-half times as far from the inner margin of the eyes as from each other. . . .*P. smithii* Saussure.
- Smaller species. Length (h. + th. + t. 1 + 2): ♀, 9.5 mm.; ♂, 9 mm. Black, with a few yellowish-white markings. The body only with a feeble silvery bloom; the abdomen covered with short, appressed, golden pubescence, without erect hair. Posterior ocelli, ♀ and ♂, nearly twice as far from the inner margin of the eyes as from each other.*P. haugi* R. du Buysson.

101. *Polistes aquilinus* R. du Buysson

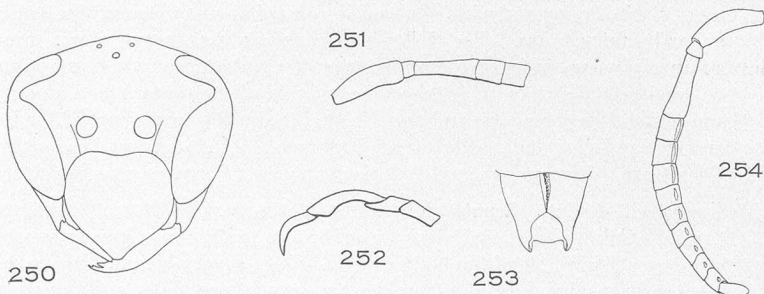
Plate I, Figure 10

♀.— In the female from Bafwasende, in the female from Leopoldville, and in one female from Stanleyville, the coloration agrees with the original description of this species. But the other females, as also the two males, have richer pale yellow markings as follows: a narrow line along the inner orbits, between the emargination of the eyes and the clypeus; small spots on the sides of the postscutellum; the valvula and two longitudinal bands in the under half of the propodeum; a feeble tubercle above the insertion of the middle and hind legs, at the under end of the meso- and metapleura; and terminal bands on tergites one and three, continuing along the sides of the first tergite, and on the apical sides of the third sternite.

♂.— Has not been hitherto described. In most of its morphological characters, it agrees with the female. Unlike most of the *Polistes* males, the shape of head and clypeus is only slightly different from that found in the female¹: the inner orbits are more convergent towards the clypeus which ends in a broadly transverse truncation. The antennæ (Fig. 254) are long and slender, all their joints being cylindrical and elongate; joints four to twelve present on their under side distinctly raised areas (tyloides) which are elongate and carina-shaped on joints four to six, short and tuberculiform on joints seven to twelve; the apical joint is normal, elongate, straight. The last abdominal sternite (Fig. 253) ends in two strongly carina-shaped, lateral projections, which are obliquely truncate and furnished with serrate, stiff setæ at their apices. Between these projections the surface of the sternite forms a strongly

¹ This is also true for *P. fastidiosus* Saussure, as well in its typical form as in its var. *sikoræ* (Saussure) and may perhaps be used as a character of the *madecassus* group.

depressed, discolored membrane which extends nearly over the posterior half of the sternite; the chitinous convex part of the sternite, in front of the depression, has a superficial longitudinal median groove.¹



Figs. 250-254. *Polistes aquilinus* R. du Buysson.

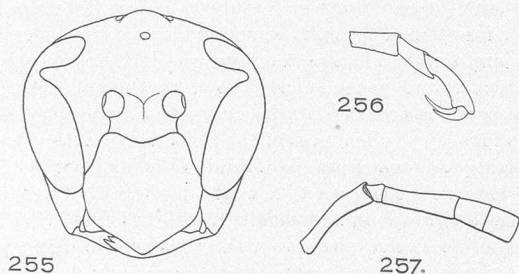
Fig. 250. Head in front, ♀. Fig. 251. Basal joints of antenna, ♀. Fig. 252. Apical joints of hind tarsus, ♀. Fig. 253. Terminal sternite of abdomen, ♂. Fig. 254. Antenna, ♂, showing the tyloides on its under side.

Belgian Congo.—Leopoldville, 1 ♀ and 2 ♂♂; Stanleyville, 10 ♀♀, April 1915; and Bafwasende, 1 ♀ and 2 ♂♂, October 1909 (Lang and Chapin Coll.).

This species is apparently restricted to the West African forest region, being known from Sierra Leone, Cameroon, Gaboon, and the Belgian Congo.

102. *Polistes fastidiosus* H. de Saussure

Belgian Congo.—Garamba, 7 ♀♀, June and July 1912 (Lang and Chapin Coll.).



Figs. 255-257. *Polistes fastidiosus* Saussure.

Fig. 255. Head in front, ♀. Fig. 256. Apical joints of hind tarsus, ♀. Fig. 257. Basal joints of antenna, ♀.

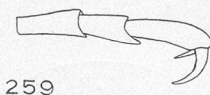
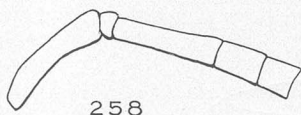
¹ The shape of the apical sternite of the male is very much the same in *P. fastidiosus* Saussure and its var. *sikoræ* (Saussure).

These specimens from the savannah region of the extreme northeastern Uele have exactly the same coloration as the females and males from Lourenzo Marques which I have seen in the collections of Cornell University.

A. v. Schulthess¹ suggests that *P. sikora* Saussure is only the Malagasy race of *P. fastidiosus* Saussure, and after careful comparison of both forms I believe this to be true.

103. *Polistes smithii* Saussure

Belgian Congo.—The collection includes only 2 ♀♀ of this species from Thysville and Kinshasa, June 1915 (Lang and Chapin Coll.).



Figs. 258–259. *Polistes smithii* Saussure.

Fig. 258. Basal joints of antenna, ♀. Fig. 259. Apical joints of hind tarsus, ♀.

104. *Polistes haugi* R. du Buysson

P. haugi and *P. smithii* are very closely related; in the male, the shape of the antennæ and of the apical abdominal sternite are similar.

Belgian Congo.—Stanleyville, 2 ♂♂ and 4 ♀♀, April 1915 (Lang and Chapin Coll.).

105. *Polistes macrocephalus*, new species

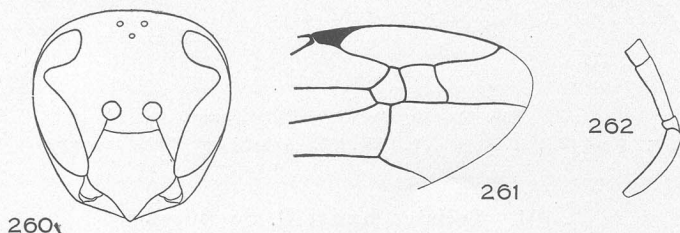
♀.—Head (Fig. 260) strongly inflated behind the eyes; the temples distinctly visible on the sides of the eyes when the head is seen in front; from above, the head is about twice as broad as long and much broader than the thorax; in profile, the temples are much broader than the eyes and scarcely narrower than the length of the third antennal joint. Carina limiting the temples behind only distinct in their upper part, disappearing behind the vertex and in their inferior half above the mandibles. Ocelli in an equilateral triangle; the posterior ocelli much more remote from the inner margin of the eyes than from each other; the vertex is very long, the distance between its hind margin and the posterior ocelli about one and one-half times that separating the posterior ocelli from the inner margin of the eyes. Oculo-malar space moderately long. Clypeus convex, its anterior margin projecting on its middle in a broadly rounded apex. Antennæ (Fig. 262) slender; their third joint slightly shorter than the scape and about three times as long as the fourth.

¹ Reise Ost-Afrika, 1903–05, Voeltzkow, Wiss. Ergebn., II, Heft 2, 1907, p. 67.

Thorax much as in *P. marginalis* Fabricius; the mesopleura with a distinct mesopleural suture and with a median episternal groove; also with a prepectal raised suture in their anterior part [type of *P. gallicus* (Linné)]. Scutellum without any trace of raised, median line. Propodeum remarkable for the almost complete lack of transverse striation; the sculpture is very minutely granulose all over; only with a faint trace of striæ on its sides in their upper part, just behind the base of the hind wings and also near its apex above the valvula. Propodeum almost without median longitudinal depression. Wing venation (Fig. 261) of the ordinary *Polistes* type. Legs normal; their claws symmetrical; the apical joint of the tarsi short and not curved.

Abdomen elongate and oval, much as in *P. marginalis*. First segment bell-shaped; as seen from above, about as long as wide at its apex; its tergite abruptly raised above its base.

Sculpture of the integument microscopical; the head, thorax, and abdomen almost uniformly covered with an extremely minute, dense punctation except on the



Figs. 260-262. *Polistes macrocephalus*, new species.

Fig. 260. Head in front, ♀. Fig. 261. Venation of front wing, ♀. Fig. 262. Basal joints of antenna, ♀.

propodeum, the sculpture of which has been given above. Temples and clypeus with a few scattered, stronger punctures. The whole body covered with a silvery bloom.

Black. Mandibles partly, oculo-malar space, outer orbits, an oblique line on each side of the vertex, under side of the flagellum, coxæ, femora, and tibiæ, ferruginous-red; the hind tibiæ turning black on their outer side. A spot on the mandibles, inner edge of the oculo-malar space, anterior half of the clypeus, inner orbits from the clypeus to the emargination of the eyes, two small dots beneath the insertion of the antennæ, under side of the scape, a very narrow line on the anterior margin of the postscutellum, valvula of the propodeum, a narrow apical margin on tergite 1 broadened on the sides so as to form lateral margins, and a small spot in the extreme basal angle of tergite 2, ivory-white. Spurs of the tibiæ brownish-black. Wings moderately smoky throughout, with a slight purplish effulgence, darker in their radial cell.

Length (h. + th. + t. 1 + 2), 10 mm. (total length, 13 mm.).

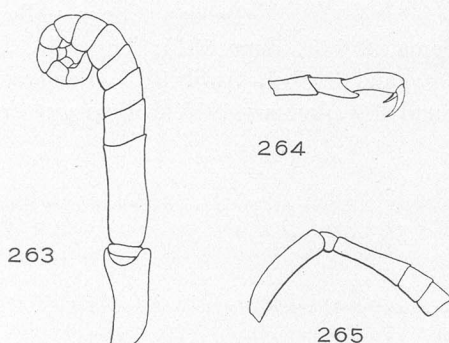
♂ unknown.

Belgian Congo.—Described from a single ♀ from Walikale (in the forest region of the eastern Belgian Congo), January 15, 1915. (J. Bequaert Coll.).

This species comes in the group of *P. marginalis* (Fabricius) and *P. spilophorus* Schletterer, owing to the structure of the mesopleura, but can easily be separated from all the described African species by its swollen head.

106. *Polistes marginalis* Fabricius

The color markings of this species being exceedingly variable, it is well to study carefully its true morphological characters, which are given in the key. The shape of the antennæ in the male (Fig. 263) is very peculiar; the joints of the flagellum, from the fifth to the apical one, are flattened dorso-ventrally and slightly excavated beneath where they present small tyloides; they are spirally rolled up towards the apex. The second joint of the flagellum is very long, much longer than the scape.



Figs. 263-265. *Polistes marginalis* Fabricius.

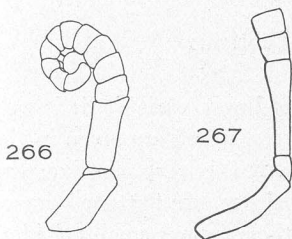
Fig. 263. ♂ Antenna, ♂. Fig. 264. Apical joints of hind tarsus, ♀. Fig. 265. Basal joints of antenna, ♀.

Belgian Congo.—One of the most common wasps. The collection includes several hundred ♀♀ and ♂♂ from Banana, Malela, Zambi, Boma, Matadi, Thysville, Kinshasa, Leopoldville, Coquilhatville, Stanleyville, Bengamisa, Vankerckhovenville, Faradje, Garamba, and Niangara (Lang and Chapin Coll.). Bogoro, Kabare, Walikale, and Lubutu (J. Bequaert Coll.).

This species is distributed over the major part of the Ethiopian region; it is apparently lacking on Madagascar, though it has been recorded from the Comoro Islands.

107. *Polistes spilophorus* Schletterer

There exists in the Belgian Congo a small *Polistes* which is very similar to *P. marginalis*. It has been described by Schletterer as *P. spilophorus*, and I am convinced that *P. tenellus* R. du Buysson is the same species.



Figs. 266-267. *Polistes spilophorus* Schletterer.

Fig. 266. Antenna, ♂. Fig. 267. Basal joints of antenna, ♀.

In the male, the antennæ (Fig. 266) are flattened and spirally rolled up, as in *P. marginalis*, but the third joint is much shorter, not longer than the first (scape).

The females are much more difficult to separate from *P. marginalis*, but I believe, nevertheless, that *marginalis* and *spilophorus* are specifically distinct.

Belgian Congo.—Banana, 1 ♀, September 1915; Boma, 2 ♀ ♀, June 1915; Thysville, 1 ♀, June 1915; Stanleyville, 5 ♀ ♀ and 3 ♂ ♂, April 1915 (Lang and Chapin Coll.). Walikale, 2 ♂ ♂ and 1 ♀, January 1915 (J. Bequaert Coll.).

EXPLANATION OF PLATES I-VI

PLATE I

- Fig. 1. *Paramischocyttarus buyssoni* Gribodo, ♂, x 2.
 Fig. 2. *Pachymenes congensis* J. Bequaert, type, ♀, x 3.
 Fig. 3. *Eumenes maxillosus* var. *tropicalis* (H. de Saussure), ♀, natural size.
 Fig. 4. *Odynerus osborni* J. Bequaert, type, ♀, natural size.
 Fig. 5. *Zethus rodhaini* J. Bequaert, type, ♀, x 2.
 Fig. 6. *Synagris æstuans* (Fabricius), ♀, natural size.
 Fig. 7. *Polybioides tabida* (Fabricius), ♀, x 2.
 Fig. 8. *Ancistrocerus kisangani* J. Bequaert, type, ♂, x 3.
 Fig. 9. *Belonogaster juncus* (Fabricius), ♂, natural size.
 Fig. 10. *Polistes fastidiosus* H. de Saussure, ♀, x 1½.
 Fig. 11. *Ropalidia guttatipennis* (H. de Saussure), ♂, x 2.

PLATE II

Color varieties of *Synagris cornuta* (Linné). All natural size.

- Fig. 1. *Synagris cornuta* var. *rufithorax* J. Bequaert, type, ♀.
 Fig. 2. " " (Linné), typical form, ♂.
 Fig. 3. " " var. *iturienis* J. Bequaert, allotype, ♂.
 Fig. 4. " " var. *didieri* (R. du Buysson), ♀.
 Fig. 5. " " var. *basalis* (Mocsáry), ♀.
 Fig. 6. " " var. *maculata* J. Bequaert, type, ♀.
 Fig. 7. " " var. *flavofasciata* J. Bequaert, allotype, ♂.
 Fig. 8. " " var. *similis* J. Bequaert, type, ♀.

PLATE III

Colony of *Synagris cornuta* (Linné), at Bengamisa, September 1914.

PLATE IV

- Fig. 1. Nest of *Synagris cornuta* (Linné) var. *flavofasciata* J. Bequaert, at Medje, June 1914.
 Fig. 2. Nest of *Polybioides tabida* (Fabricius), at Medje, April 1914.

PLATE V

- Fig. 1. Nest of *Polybioides melaina* G. Meade Waldo, at Stanleyville, August 1909.
 Fig. 2. The same nest of *P. melaina*, partly destroyed.

PLATE VI

Nest of *Belonogaster dubius* Kohl, at Faradje, September 1912; photographed from two different sides.

A BIBLIOGRAPHIC AND SYNONYMIC CATALOGUE OF THE ETHIOPIAN VESPIDÆ

The following list brings together the published references to the diplopterous wasps of the Ethiopian region. With a few exceptions, these references have been checked up with the original paper. I am much indebted to Mr. J. C. Crawford, of the United States National Museum, for prompt and courteous aid in securing valuable bibliographic information.

I was unable to consult the following publications; they are quoted here after Dalla Torre's *Catalogus Hymenopterorum*.

DESMAREST, in Chenu, *Encyclop. Hist. nat., Animaux*, 1860.

KLUG, in Weber and Mohr, *Beiträge zur Naturkunde*, I, 1805.

LEPELETIER, in *Encyclopédie méthodique, Ins.*, X, 1825.

MAINDRON, *Moniteur du Sénégal et Dépendances*, 1879.

MASARINÆ

1. *Masaris* FABRICIUS

Ent. Syst., II, 1793, pp. VI and 283.

Mazaris W. A. SCHULZ, *Zoolog. Ann. Würzburg*, IV, 1911, p. 199.

Genotype: *Masaris vespiformis* Fabricius, 1793.

1. ***Masaris discrepans*** H. BRAUNS, *Ent. Mitt. Berlin*, II, 1913, p. 203; Pl. II, fig. 9a (♀ ♂).

Cape Colony.—Type locality: "Worcester."

2. ***Masaris saussurei*** H. BRAUNS, *Ann. Mus. nat. Hungarici*, III, 1905, pp. 219 and 222 (♀ ♂); *Ent. Mitt. Berlin*, II, 1913, p. 205; Pl. II, fig. 10a; *Zeitschr. wiss. Insektenbiol.*, VI, 1910, p. 387 (ethology).

Cape Colony.—Type locality: "Willowmore."

3. ***Masaris spinolæ*** H. DE SAUSSURE, *Et. fam. Vesp.*, III, *Masar.*, 1854, p. 95 (♀). F. SMITH, *Cat. Hym. Brit. Mus.*, V, *Vesp.*, 1857, p. 5. DALLA TORRE, *Cat.*, IX, *Vesp.*, 1894, p. 4; *Gen. Ins. Vesp.*, 1904, p. 8.

Cape Colony.—Type locality: "Cap de Bonne-Espérance."

Belongs, perhaps, to the genus *Masariella* Brauns.

2. *Masariella* H. BRAUNS

Ann. Mus. nat. Hungarici, III, 1905, p. 223.

Genotype: *Masaris alfkeni* R. du Buysson, 1904.

1. ***Masariella alfkeni*** (R. DU BUYSSON) H. BRAUNS, *Ann. Mus. nat. Hungarici*, III, 1905, p. 223 (♀ ♂); *Zeitschr. wiss. Insektenbiol.*, VI, 1910, p. 446 (ethology).

Masaris alfkeni R. DU BUYSSON, *Bull. Soc. ent. France*, 1904, p. 144 (♀).

Cape Colony, Damaraland.—Type locality: "Swakopmund."

3. **Ceramius** LATREILLE

Considér. génér. Crust. Arachn. Ins., 1810, pp. 329 and 438.

Gnatho KLUG, Mag. Ges. naturf. Freunde Berlin, IV, 1810, p. 36 (*nec* ILLIGER, 1807).

Genotype: *Ceramius fonscolombii* Latreille, 1810.

1. **Ceramius beyeri** H. BRAUNS, Zeitschr. syst. Hym. Dipt., III, 1903, p. 69 (♀ ♂); Zeitschr. wiss. Insektenbiol., VI, 1910, p. 445 (ethology); Ent. Mitt. Berlin, II, 1913, Pl. II, figs. 4a-c.

Cape Colony.— Type locality: "Willowmore."

2. **Ceramius bicolor** (THUNBERG) W. A. SCHULZ, Berliner ent. Zeitschr., LVII, 1912, p. 68.

Philanthus bicolor THUNBERG, Nova Acta Soc. Sc. Upsala, VII, 1815, pp. 127, 131, and 289 (♂).

Ceramius karrooensis H. BRAUNS Zeitschr. syst. Hym. Dipt., II, 1902, p. 282 (♀ ♂); III, 1903, p. 68; Zeitschr. wiss. Insektenbiol., VI, 1910, p. 387 (ethology); Ent. Mitt. Berlin, II, 1913, Pl. II, figs. 5a-f.

Cape Colony.— Type locality: unknown.

3. **Ceramius caffer** H. de SAUSSURE, Et. fam. Vesp., III, Masar., 1854, p. 76 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 4. DALLA TORRE, Cat., IX, Vesp., 1894, p. 2; Gen. Ins. Vesp., 1904, p. 6.

Cape Colony.— Type locality: "Cap de Bonne-Espérance."

Perhaps a variety of *C. lichtensteinii* Klug.

4. **Ceramius capensis** H. de SAUSSURE, Et. fam. Vesp., III, Masar., 1854, p. 66; Pl. III, figs. 3 and 3a (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 3. DALLA TORRE, Cat., IX, Vesp., 1894, p. 2; Gen. Ins. Vesp., 1904, p. 6.

Cape Colony.— Type locality: "Cap de Bonne-Espérance."

5. **Ceramius capicola** H. BRAUNS, Zeitschr. syst. Hym. Dipt., II, 1902, p. 278 (♀ ♂); III, 1903, p. 68; Ent. Mitt. Berlin, II, 1913, Pl. II, figs. 7a-d; Zeitschr. wiss. Insektenbiol., VI, 1910, p. 387 (ethology). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 6.

Cape Colony.— Type locality: "Willowmore."

6. **Ceramius cerceriformis** H. de SAUSSURE, Ann. Soc. ent. France, (3), I, 1853, Bull., p. xxi (♂); Et. fam. Vesp., III, Masar., 1854, p. 72; Pl. IV, figs. 1 and 1a-d (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 4. DALLA TORRE, Cat., IX, Vesp., 1894, p. 2; Gen. Ins. Vesp., 1904, p. 6; Pl. I, figs. 4 and 4a-b.

Cape Colony.— Type locality: "Cap de Bonne-Espérance."

Belongs to the subgenus *Ceramioides* Saussure.

7. **Ceramius consobrinus** H. de SAUSSURE, Et. fam. Vesp., III, Masar., 1854, p. 77 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 5. DALLA TORRE, Cat., IX, Vesp., 1894, p. 3; Gen. Ins. Vesp., 1904, p. 6. H. BRAUNS, Ent. Mitt. Berlin, II, 1913, p. 198; Pl. II, figs. 2a-d (♀ ♂).

Cape Colony.— Type locality: "Cap de Bonne-Espérance."

8. **Ceramius fumipennis** H. BRAUNS, Zeitschr. syst. Hym. Dipt., II, 1902, p. 275 (♀ ♂); III, 1903, p. 68; Ent. Mitt. Berlin, II, 1913; Pl. II, figs. 8a-f; Zeitschr. wiss. Insektenbiol., VI, 1910, p. 445 (ethology). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 6.

Cape Colony.— Type locality: "Willowmore."

9. **Ceramius lichtensteinii** KLUG, Entom. Monogr., 1824, p. 225. H. DE SAUSSURE, Et. fam. Vesp., III, Masar., 1854, p. 73. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 4. DALLA TORRE, Cat., IX, Vesp., 1894, p. 3; Gen. Ins. Vesp., 1904, p. 6. H. BRAUNS, Ent. Mitt. Berlin, II, 1913, p. 194; Pl. II, figs. 1a-b; Zeitschr. wiss. Insektenbiol., VI, 1910, p. 445 (ethology).

Gnatho lichtensteinii KLUG, Mag. Ges. naturf. Freunde Berlin, IV, 1810, p. 38; Pl. I, figs. 3 and 3e-f (♀).

Ceramius rufomaculatus P. CAMERON, Trans. South African Philos. Soc., XVI, pt. 4, 1906, p. 325 (♀).

Cape Colony.—Type locality: "Cap."

9a. var. **macrocephalus** (H. DE SAUSSURE) H. BRAUNS, Ent. Mitt. Berlin, II, 1913, p. 194 (♀ ♂).

Ceramius macrocephalus H. DE SAUSSURE, Et. fam. Vesp., III, Masar., 1854, p. 76; Pl. III, figs. 2, 2a, and 2c (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 4. DALLA TORRE, Cat., IX, Vesp., 1894, p. 3; Gen. Ins. Vesp., 1904, p. 6. H. BRAUNS, Zeitschr. syst. Hym. Dipt., III, 1903, pp. 65 and 68 (♀ ♂); Zeitschr. wiss. Insektenbiol., VI, 1910, p. 445 (ethology).

Cape Colony.—Type locality: "Cap de Bonne-Espérance."

10. **Ceramius linearis** KLUG, Entom. Monogr., 1824, p. 227 (♂). H. DE SAUSSURE, Et. fam. Vesp., III, Masar., 1854, p. 71. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 4. DALLA TORRE, Cat., IX, Vesp., 1894, p. 3; Gen. Ins. Vesp., 1904, p. 6.

Cape Colony.—Type locality: "Uitenhagen."

Belongs to the subgenus *Paraceramius* Saussure.

11. **Ceramius nigripennis** H. DE SAUSSURE, Et. fam. Vesp., III, Masar., 1854, p. 69; Pl. III, figs. 4 and 4c (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 4. DALLA TORRE, Cat., IX, Vesp., 1894, p. 3; Gen. Ins. Vesp., 1904, p. 6. H. BRAUNS, Ent. Mitt. Berlin, II, 1913, p. 201; Pl. II, figs. 3a-f (♀ ♂).

Cape Colony.—Type locality: "Cap de Bonne-Espérance."

Belongs to the subgenus *Paraceramius* Saussure.

12. **Ceramius peringueyi** H. BRAUNS, Ent. Mitt. Berlin, II, 1913, p. 194 (♀).

Cape Colony.—Type locality: "Capstadt."

13. **Ceramius rex** H. DE SAUSSURE, Et. fam. Vesp., III, Masar., 1854, p. 75 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 4. DALLA TORRE, Cat., IX, Vesp., 1894, p. 3; Gen. Ins. Vesp., 1904, p. 6.

Cape Colony.—Type locality: "Cap de Bonne-Espérance."

Perhaps a variety of *C. lichtensteinii* Klug.

14. **Ceramius schulthessi** H. BRAUNS, Zeitschr. syst. Hym. Dipt., II, 1902, p. 182 (♀); Ent. Mitt. Berlin, II, 1913, p. 196; Pl. II, figs. 6a-d (♀ ♂); Zeitschr. wiss. Insektenbiol., VI, 1910, p. 445 (ethology). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 6.

Cape Colony.—Type locality: "Willowmore."

15. **Ceramius vespiformis** H. DE SAUSSURE, Et. fam. Vesp., III, Masar., 1854, p. 79 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 5. DALLA TORRE, Cat., IX, Vesp., 1894, p. 3; Gen. Ins. Vesp., 1904, p. 6.

Cape Colony.—Type locality: "Cap de Bonne-Espérance."

4. **Celonites** LATREILLE

Hist. nat. Crust. et Ins., III, 1802, p. 368.

Genotype: *Vespa abbreviata* Villers, 1789 (= *Chrysis dubia* Rossi, 1790; *Masaris apiformis* Fabricius, 1793).

1. **Celonites andrei** H. BRAUNS, Ann. Mus. nat. Hungarici, III, 1905, pp. 228 and 233 (♀); Ent. Mitt. Berlin, II, 1913, pp. 206, 207, and 208 (♀ ♂).

Cape Colony.—Type locality: "Willowmore."

2. **Celonites capensis** H. BRAUNS, Ann. Mus. nat. Hungarici, III, 1905, pp. 231 and 233 (♀); Ent. Mitt. Berlin, II, 1913, pp. 205, 207, and 208 (♀ ♂).

Cape Colony.—Type locality: "Willowmore."

3. **Celonites clypeatus** H. BRAUNS, Ent. Mitt. Berlin, II, 1913, pp. 206 and 207 (♀).

Cape Colony.—Type locality: "Willowmore."

4. **Celonites fischeri** SPINOLA, Ann. Soc. ent. France, VII, 1838, p. 505 (♀). C. T. BINGHAM, Journ. Bombay Nat. Hist. Soc., XII, pt. 1, 1898, p. 111. R. DU BUYSSON, Rev. d'Ent. Caen, XXV, 1908, p. 103 (♀ ♂).

SAVIGNY, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. ix, fig. 19 (♂) (*nec* ♀). Egypt, Southern Arabia.—Type locality: "Egypte."

5. **Celonites jousseumei** R. DU BUYSSON, Rev. d'Ent. Caen, XXV, 1906, p. 104 (♀ ♂).

Obock.—Type locality: "Obock, Djibouti, Tadjourah."

6. **Celonites promontorii** H. BRAUNS, Ann. Mus. nat. Hungarici, III, 1905, pp. 232 and 233 (♀); Ent. Mitt. Berlin, II, 1913, pp. 205, 207, and 208 (♀ ♂).

Cape Colony.—Type locality: "Willowmore."

7. **Celonites purcelli** H. BRAUNS, Ann. Mus. nat. Hungarici, III, 1905, pp. 226 and 233 (♀ ♂); Zeitschr. wiss. Insektenbiol., VI, 1910, p. 386 (ethology); Ent. Mitt. Berlin, II, 1913, pp. 207 and 208 (♀ ♂).

Cape Colony.—Type locality: "Willowmore."

7a. var. **flavomaculatus** H. BRAUNS, Ent. Mitt. Berlin, II, 1913, pp. 205 and 208 (♂).

Cape Colony.—Type locality: "Willowmore."

8. **Celonites rothschildi** R. DU BUYSSON, Rev. d'Ent. Caen, XXV, 1906, p. 105 (♂).

British East Africa.—Type locality: "Lesammise, Rendilé."

9. **Celonites wheeleri** H. BRAUNS, Ann. Mus. nat. Hungarici, III, 1905, pp. 230 and 233 (♀ ♂); Ent. Mitt. Berlin, II, 1913, pp. 207 and 208 (♀ ♂).

Cape Colony.—Type locality: "Willowmore."

9a. var. **immaculatus** H. BRAUNS, Ann. Mus. nat. Hungarici, III, 1905, pp. 230 and 233 (♀); Ent. Mitt. Berlin, II, 1913, pp. 205, 207, and 208 (♀ ♂).

Cape Colony.—Type locality: "Willowmore."

5. **Jugurtia** H. DE SAUSSURE

Et. fam. Vesp., III, Masar., 1854, p. 83.

Jugurthia DALLA TORRE, Cat., IX, Vesp., 1894, p. 5.

Jujurtha ASHMEAD, Canadian Entom., XXXIV, 1902, p. 220.

Genotype: *Celonites oraniensis* Lepeletier, 1841.

1. **Jugurtia simpsoni** G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 448 (♀).

Gambia.—Type locality: "Patchari."

6. **Quartinia** GRIBODO

In Ed. André, Spéc. Hym. Eur. Algér., II, 1884, pp. 811 and 822.

Genotype: *Quartinia dilecta* Gribodo, 1884.

1. **Quartinia capensis** F. KOHL, Term. Füzetek, XXI, 1898, p. 365 (♀).
DALLA TORRE, Gen. Ins. Vesp., 1904, p. 8. H. BRAUNS, Zeitschr. wiss. Insektenbiol., VII, 1911, p. 17 (ethology).

Cape Colony.—Type locality: "Algoa Bay."

2. **Quartinia paradoxa** H. BRAUNS, Ann. Mus. nat. Hungarici, III, 1905, p. 233 (♂).

Cape Colony.—Type locality: "Willowmore."

RAPHIGLOSSINÆ

7. **Raphiglossa** S. S. SAUNDERS

Trans. Ent. Soc. London, (2), I, pt. 3, 1850, p. 71.

Raphidoglossa DALLA TORRE, Cat., IX, Vesp., 1894, p. 7.

Genotype: *Raphiglossa eumenoides* S. Saunders, 1850.

1. **Raphiglossa braunsiana** (A. VON SCHULTHESS).

Raphidoglossa braunsiana A. VON SCHULTHESS, Soc. entomol., XXVIII, 1913, p. 1 (♂).

Cape Colony.—Type locality: "Willowmore."

2. **Raphiglossa flavo-ornata** (P. CAMERON).

Raphiglossa flavo-ornata P. CAMERON, Trans. South African Philos. Soc., XV, pt. 4, 1905, p. 231 (♀); Ann. Transvaal Mus., II, 3, 1910, p. 156.

Raphidoglossa flavo-ornata G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 45 (♀ ♂).

Raphidoglossa punctata G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), V, 1910, p. 34 (♂); (8), VIII, 1911, p. 449 (♀ ♂).

Cape Colony, Transvaal, Angola, North East Rhodesia, Katanga, north-eastern Uele.—Type locality: "Dunbrody."

3. **Raphiglossa natalensis** F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 8; Pl. I, fig. 4 (♀).

Raphidoglossa natalensis DALLA TORRE, Cat., IX, Vesp., 1894, p. 7; Gen. Ins. Vesp., 1904, p. 12. G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 450. A. VON SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 270.

Natal, Delagoa Bay.—Type locality: "Port Natal."

4. **Raphiglossa symmorpha** H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 279; Pl. VIII, fig. 2 (♀); III, Suppl., 1854, p. 114. Ed. ANDRÉ, Spéc. Hym. Eur. Algér., II, fasc. 21–23, 1884, p. 612 (♀). P. MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 608.

Raphidoglossa symmorpha DALLA TORRE, Cat., IX, Vesp., 1894, p. 7; Gen. Ins. Vesp., 1904, p. 12.

Raphiglossa filiformis H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 3 (♂, nec ♀).

Abyssinia, (Algeria?).— Type locality: "Algérie."

ZETHINÆ

8. *Zethus* FABRICIUS

Syst. Piez., 1804, pp. xii and 282.

Calligaster H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 22.

Genotype: *Vespa cæruleopennis* Fabricius, 1798.

1. *Zethus delagoensis* A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 270 (♀).

Calligaster delagoensis DALLA TORRE, Gen. Ins. Vesp., 1904, p. 17.

Discælius transvaalensis C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), X, 1902, p. 218 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 18.

Delagoa Bay, eastern Transvaal.— Type locality: "Delagoa."

I have seen females from Delagoa Bay, which agree perfectly with A. v. Schulthess' description of *Z. delagoensis* and also with Bingham's *Discælius transvaalensis*, so that I feel sure of the identity of both; *Z. pubescens* Smith may be the same species.

2. *Zethus favillaceus* WALKER, List Hym. Egypt, 1871, p. 28 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 11; Gen. Ins. Vesp., 1904, p. 17.

Obock.— Type locality: "Tajura."

3. *Zethus* (?) *pubescens* F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 9 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 13; Gen. Ins. Vesp., 1904, p. 16.

Natal.— Type locality: "Port Natal."

4. *Zethus rodhaini* J. BEQUAERT. See p. 33 (♀).

Belgian Congo.— Type locality: Walikale.

9. *Elimus* H. DE SAUSSURE

Et. fam. Vesp., I, Eum., 1852, p. 7.

Genotype: *Elimus australis* H. de Saussure, 1852.

1. *Elimus arabicus* G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), V, 1910, p. 40 (♀).

Obock.— Type locality: "Straits of Bab-el-Mandeb."

This species may be a synonym of *Zethus favillaceus* Walker, 1871, which was described from the same locality.

10. *Pareumenes* H. DE SAUSSURE

Et. fam. Vesp., III, Suppl., 1854, p. 133.

Genotype: *Eumenes quadrispinosus* Saussure, 1854.

1. *Pareumenes sansibaricus* (W. A. SCHULZ).

Eumenes sansibarica W. A. SCHULZ, Hymen. Studien, 1905, p. 9 (♀).

Pareumenes marshalli G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), V, 1910, p. 45 (♀).

Zanzibar, Mashonaland.—Type locality: "Sansibar."

11. *Paramischocyttarus* P. MAGRETTI

Bull. Soc. ent. Italiana, XV, (1883), 1884, p. 250; Ann. Mus. civ. Genova, XXI, 1884, p. 600.

Tanyzethus P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 195.

Genotype: *Paramischocyttarus subtilis* Magretti, 1884.

1. *Paramischocyttarus buyssoni* (GRIBODO) DALLA TORRE, Gen. Ins. Vesp., 1904, p. 83.

Paramischocyttarus buyssoni GRIBODO, Miscellanea entomologica, IV, 1896, p. 13 (♂).

Senegal, Belgian Congo.—Type locality: "Dakar."

2. *Paramischocyttarus lacuum* H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 34 (♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 83.

Lake Nyasa.—Type locality: "Nyassa-See."

3. *Paramischocyttarus subtilis* P. MAGRETTI, Bull. Soc. ent. Italiana, XV, (1883), 1884, p. 251, fig. 2 (♂); Ann. Mus. civ. Genova, XXI, 1884, p. 602, fig. (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 117; Gen. Ins. Vesp., 1904, p. 83; Pl. VI, figs. 3a, 3b, and 3c. A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 18.

Tanyzethus africanus P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 195 (♀).

Paramischocyttarus africanus G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 54.

East Africa, Abyssinia.—Type locality: "torrente Gasch nella vicinanze di Kassala" (eastern Sudan).

12. *Ischnogasteroides* P. MAGRETTI

Bull. Soc. ent. Italiana, XV, (1883), 1884, p. 251. Ann. Mus. civ. Genova, XXI, 1884, p. 603.

Genotype: *Ischnogasteroides flavus* Magretti, 1884.

1. *Ischnogasteroides flavus* MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 606, fig. (♀); Bull. Soc. ent. Italiana, XV, (1883), 1884, p. 252, fig. 3. DALLA TORRE, Cat., IX, Vesp., 1894, p. 113; Gen. Ins. Vesp., 1904, p. 84; Pl. VI, figs. 5a and 5b.

Abyssinia.—Type locality: "rive del Kor Cheru (confini settentrionali dell' Abissinia)."

13. *Labus* H. DE SAUSSURE

Reise d. Novara, Zool., II, 1, Hym., 1867, p. 3.

Smithia H. DE SAUSSURE, Rev. Mag. de Zool., (2), VII, 1855, p. 371 (*nec* EDWARDS and HAIME, 1851).

Hymenosmithia DALLA TORRE, Gen. Ins. Vesp., 1904, p. 61.

Stroudia GRIBODO, Bull. Soc. ent. Italiana, XXIII, 1891, p. 262.

Micreumenes ASHMEAD, Canadian Entomologist, XXXIV, 1902, p. 208.

Genotype: *Labus spiniger* H. de Saussure, 1867.

1. **Labus annulatus** G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), V, 1910, p. 36 (♀ ♂); (8), VIII, 1911, p. 450.

Natal.—Type locality: "Durban."

2. **Labus annulipes** P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exped. Kili-
mandjaro, II, 8, 6, 1910, p. 182 (♂). G. MEADE WALDO, Ann. Mag. Nat. Hist.,
(8), XI, 1913, p. 50 (♀ ♂).

Labus fragilis G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 433
(♀ ♂).

Rhodesia, East Africa.—Type locality: "Kilimandjaro, lower Kibonoto."

3. **Labus armatus** (GRIBODO) F. KOHL, Denkschr. k. Ak. Wiss. Wien, math.
naturw. Kl., LXXI, 1, 1907, p. 249.

Stroudia armata GRIBODO, Bull. Soc. ent. Italiana, XXIII, 1891, p. 264 (♀).
DALLA TORRE, Cat., IX, Vesp., 1894, p. 14; Gen. Ins. Vesp., 1904, p. 18.

Cape Colony.—Type locality: "Port Elizabeth."

4. **Labus chudeauui** R. DU BUYSSON, Bull. Soc. ent. France, 1908, p. 132
(♀).

Southern Sahara.—Type locality: "Ahaggar (oued Amga)."

The generic position of this species is doubtful.

5. **Labus floricola** H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt.
1, Hym., 1890, p. 151; Pl. xxii, fig. 3 (♂, described as ♀); Abh. Senckenb. naturf.
Ges. Frankfurt a. M., XXVI, 2, 1900, p. 235 (♀ ♂). DALLA TORRE, Cat., IX,
Vesp., 1894, p. 8; Gen. Ins. Vesp., 1904, p. 13. F. KOHL, Denkschr. k. Ak. Wiss.
Wien, math. naturw. Kl., LXXI, 1, 1907, pp. 228 and 244; Pl. iv, figs. 28 and 29;
Pl. vi, figs. 5 and 23; Pl. vii, figs. 11, 21, and 26 (♂).

Madagascar, Nossi Bé.—Type locality: "Madagascar: Antananarivo."

6. **Labus garambensis** J. BEQUAERT. See p. 51 (♀ ♂).

Belgian Congo.—Type locality: Garamba.

7. **Labus gracilis** F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw.
Kl., LXXI, 1, 1907, pp. 227 and 242; Pl. vi, fig. 27; Pl. vii, figs. 6, 22, and
23 (♂).

Arabia.—Type locality: "Halbinsel Sinai (Tor)."

8. **Labus macrostylus** F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw.
Kl., LXXI, 1, 1907, pp. 232 and 242; Pl. iv, fig. 20; Pl. vi, figs. 3 and 26; Pl. vii,
fig. 2 (♀).

Micreumenes curriei ASHMEAD, Canadian Entomol., XXXIV, 1902, p. 208
(without description).

Sierra Leone, Liberia, Belgian Congo.—Type locality: "Sierra Leone."

9. **Labus maculicollis** P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kili-
mandjaro, II, 8, 6, 1910, p. 181 (♀ ♂). G. MEADE WALDO, Ann. Mag. Nat. Hist.,
(8), XI, 1913, p. 51.

Labus adelphus G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), VIII, 1911, p.
452 (♂).

Uganda, East Africa, Belgian Congo.—Type locality: "Kilimandjaro: Kibo-
noto, 1000–1300 m."

10. **Labus madecassus** A. v. SCHULTHESS, Reise in Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, Heft 2, 1907, p. 69, figs. 4-8 (♂).

Madagascar.—Type locality: "Kinkuni-See (N. W. Madagascar)."

11. **Labus maindroni** R. DU BUYSSON, Rev. d'Ent. Caen, XXV, 1906, p. 107 (♀). G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 450.

Obock.—Type locality: "Obock."

12. **Labus natalensis** (SAUSSURE).

Smithia natalensis H. DE SAUSSURE, Rev. Mag. de Zool., (2), VII, 1855, p. 371 (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 9; Pl. I, fig. 5. DALLA TORRE, Cat., IX, Vesp., 1894, p. 8.

Hymenosmithia natalensis DALLA TORRE, Gen. Ins. Vesp., 1904, p. 61.

Natal.—Type locality: "Port Natal."

13. **Labus rothschildanus** R. DU BUYSSON, Rev. d'Ent. Caen, XXV, 1906, p. 106 (♂). G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 451.

British East Africa.—Type locality: "Makindu."

14. **Labus rufipes** (P. CAMERON).

Smithia (?) *rufipes* P. CAMERON, Trans. South African Philos. Soc., XV, pt. 4, 1905, p. 230 (♂).

Cape Colony.—Type locality: "Brak Kloof."

Probably a synonym of *L. natalensis* (Saussure).

15. **Labus rufipetiolatus** A. v. SCHULTHESS, Soc. entomol., XXVIII, 1913, p. 1, fig. (♂).

Cape Colony.—Type locality: "Kapland."

16. **Labus superbus** G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), V, 1910, p. 36 (♂).

White Nile.—Type locality: "White Nile."

17. **Labus swalei** G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 451 (♀ ♂).

Nubian desert.—Type locality: "between Korosko and Abu Hamed."

EUMENINÆ

14. **Eumenes** LATREILLE¹

Hist. nat. Crust. Ins., III, 1802, p. 360.

Genotype: *Vespa coarctata* Linné, 1758.

1. **Eumenes acuminatus** H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 147; Pl. VIII, fig. 2 (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 26. GRIBODO, Ann. Mus. civ. Genova, XXI, 1884, p. 296 (♀); Bull. Soc. ent. Italiana, XVI, 1884, p. 284. DALLA TORRE, Cat., IX, Vesp., 1894, p. 17; Gen. Ins. Vesp., 1904, p. 20. A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 17.

Cape Colony, Abyssinia.—Type locality: "le Cap de Bonne-Espérance."

According to A. v. Schulthess, Soc. entomol., XXV, 1910, p. 24, *E. acuminatus* Gribodo is specifically distinct from *E. acuminatus* H. de Saussure.

¹ *E. artifex* Smith and *E. perplexus* Smith, recorded from the Ethiopian region by Dalla Torre, Gen. Ins. Vesp., 1904, are found only in the Oriental region.

2. **Eumenes arbustorum** (PANZER) SCHENCK, Jahrb. Ver. Naturk. Nassau, IX, 1, 1853, p. 79.

Vespa arbustorum PANZER, Fauna Ins. Germaniæ, VI, 1799, p. 63; Pl. v.

Eumenes macrocephala H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 37 (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 26. DALLA TORRE, Cat., IX, Vesp., 1894, p. 26; Gen. Ins. Vesp., 1904, p. 23.

E. macrocephala was described from South Africa; A. v. Schulthess, however, found the type specimen conspecific with the Palearctic *E. arbustorum*; the locality label was probably incorrect, as this species was never since recorded from South Africa (Soc. entomol., XXV, 1910, p. 24).

3. **Eumenes bisignatus** WALKER, List Hym. Egypt, 1871, p. 29 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 19; Gen. Ins. Vesp., 1904, p. 21.

Arabia.—Type locality: "Wâdy Ferran."

4. **Eumenes braunsianus** A. v. SCHULTHESS, Soc. entomol., XXVIII, 1913, p. 2 (♀ ♂).

South Africa.—Type locality: "Johannisburg."

5. **Eumenes caffer** (LINNÉ) H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 45 (♀). F. SMITH, Cat., Hym. Brit. Mus., V, Vesp., 1857, p. 26. WALKER, List Hym. Egypt, 1871, p. 29. DALLA TORRE, Cat., IX, Vesp., 1894, p. 19; Gen. Ins. Vesp., 1904, p. 21. C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), X, 1902, p. 219. R. DU BUYSSON, Bull. Soc. ent. France, 1908, p. 134; in A. Chevalier, L'Afrique centrale française, 1908, p. 707; Act. Soc. Linn. Bordeaux, LXIV, 1910, p. 228. A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 17.

Vespa caffra LINNÉ, Syst. Nat., ed. 12a, I, 2, 1767, p. 951. OLIVIER, Encycl. méthod. Ins., VI, 1791, p. 670.

Sphex cruciata CHRIST, Naturg. d. Insecten, 1791, p. 317; Pl. xxxii, fig. 2.

Vespa crucigera WEBER, Observ. entom., 1801, p. 101.

Eumenes formosa H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 55 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 24; Gen. Ins. Vesp., 1904, p. 22.

Distribution of the typical form: Cape Colony, Transvaal, Atlantic coast of the Sahara, Central Sahara, Belgian Congo.—Type locality: "ad Cap. B. spei."

5a. var. **dyscherus** (H. DE SAUSSURE).

Eumenes dyschera H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 50 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 27. DALLA TORRE, Cat., IX, Vesp., 1894, p. 23; Gen. Ins. Vesp., 1904, p. 22.

Tropical Africa, Belgian Congo.—Type locality: "l'Afrique tropicale."

5b. var. **esuriens** (FABRICIUS).

Vespa esuriens FABRICIUS, Mant. Ins., I, 1787, p. 293. OLIVIER, Encycl. méthod. Ins., VI, 1791, p. 673.

Eumenes esuriens H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 56; Pl. xi, fig. 2 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 23; Gen. Ins. Vesp., 1904, p. 22. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 22. WALKER, List Hym. Egypt, 1871, p. 29. ED. ANDRÉ, Spéc. Hym. Eur. Algér., II, pt. 21–23, 1884, p. 619. MORICE, Res. Swed. Zool. Exp. Jägerskiöld, pt. 1, 1904, Hym. acul., p. 3. E. ROUBAUD, Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 60–61 (ethology).

Senegal, Egypt, Eritrea, Southern Arabia, Belgian Congo. (Persia, India, Southern China, Formosa, Malay Archipelago, Queensland).—Type locality: "India."

5c. var. **gracilis** (H. DE SAUSSURE).

Eumenes gracilis H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 57 (♀ ♂).
C. T. BINGHAM, Fauna Brit. India, Hym., I, 1897, p. 343, fig. 97 (♀ ♂).

SAVIGNY, Descr. Egypte, Atlas, Zool., Ins. Hym. 1812, Pl. VIII, fig. 6 (♀ and ♂).

Eumenes esuriens var. *gracilis* H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 132 (♀ ♂). MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 612. DALLA TORRE, Cat., IX, Vesp., 1894, p. 23; Gen. Ins. Vesp., 1904, p. 22.

Egypt, White Nile, Senegal, Belgian Congo. (India).— Type locality: "l'Egypte."

6. ***Eumenes capensis*** A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 18 (♀ ♂).

Cape Colony.— Type locality: "Kapland."

7. ***Eumenes dilectulus*** WALKER, List Hym. Egypt, 1871, p. 30 (♂) DALLA TORRE, Cat., IX, Vesp., 1894, p. 22; Gen. Ins. Vesp., 1904, p. 22.

Arabia.— Type locality: "Wády Gennéh."

8. ***Eumenes elegans*** H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 58; Pl. XI, fig. 3 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 25. DALLA TORRE, Cat., IX, Vesp., 1894, p. 23; Gen. Ins. Vesp., 1904, p. 22. C. T. BINGHAM, Fauna Brit. India, Hym., I, 1897, p. 344.

Arabia. (India).— Type locality: "Djidda en Arabie."

Probably a color variety of *E. caffer* (Linné).

9. ***Eumenes femoratus*** A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 18 (♀ ♂).

Eumenes pulchripennis P. CAMERON, Ann. Transvaal Mus., II, pt. 3, 1910, pp. 158 and 160 (♀). (See A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 14).

South Africa.— Type locality: "Lobatsi."

10. ***Eumenes füllebornianus*** A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 18 (♀ ♂).

Zanzibar, Nyasaland.— Type locality: "Sansibar."

11. ***Eumenes higletti*** G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), V, 1910, p. 43 (♀).

Gold Coast.— Type locality: "Tamsoo."

12. ***Eumenes langi*** J. BEQUAERT. See p. 84 (♀).

Belgian Congo.— Type locality: Boma.

13. ***Eumenes lepeletieri*** H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 45; Pl. x, fig. 3 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 26. MAGRETTI, Ann. Mus. civ. Genova, (2), XIX, 1898, p. 33. C. T. BINGHAM, Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 109. GRIBODO, Mem. Ac. Sc. Bologna, Sc. natur., (5), V, 2, 1895, p. 89.

Eumenes formosa var. *lepeletieri* H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 130.

Eumenes lepeletieri F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 27. GERSTÆCKER, in v. d. Decken's Reisen in Ost-Afrika, III, 2, Gliederth., 1873, p. 322; Arch. f. Naturg., XXXVII, 1, 1871, p. 350. RADOSZKOWSKY, Hor. Soc. ent. Rossicæ, XII, 2, 1876, p. 141; Journ. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 203. ED. ANDRÉ, Spéc. Hym. Eur. Algér., II, fasc. 21–23, 1884, p. 632. GRIBODO, Ann. Mus. civ. Genova, XXI, 1884, p. 292. MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 611 (♀ ♂); (2), XV, 1895, p. 170. Fox, Proc. Ac. Nat. Sc. Philadelphia, XLVIII, 1896, p. 554. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 29. A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV,

1899, p. 271; Soc. entomol., XXV, 1910, p. 17. C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), X, 1902, p. 219; (7), XII, 1903, p. 67. MORICE, Res. Swed. Zool. Exp. Jägerskiöld, pt. 1, 1904, Hym. acul., p. 3. DALLA TORRE, Gen. Ins. Vesp., 1904, p. 23. P. CAMERON, Ann. Transvaal Mus. II, 3, 1910, p. 158. W. A. SCHULZ, Hymen. Studien, 1905, p. 9.

Eumenes janseii P. CAMERON, Ann. Transvaal Mus., II, 3, 1910, p. 157 (♀).

Eumenes meruensis P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, pp. 175 and 176 (♀) (See G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 51; A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 14).

Eumenes granti W. F. KIRBY, Bull. Liverpool Mus., III, 1900, p. 18 (♀); Nat. Hist. of Sokotra by H. O. Forbes, Zool. Hym., 1903, p. 246; Pl. xv, fig. 5 (♀). F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 224 (♀ ♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 23.

The typical form is widely distributed throughout the Ethiopian part of the African continent: Senegal, White Nile, Abyssinia, Somaliland, East Africa, Transvaal, Natal, Angola, Lower Belgian Congo, Southern Arabia, Sokotra; also in Egypt, Syria and on Cyprus.—Type locality: "le Sénégal."

13a. var. *alluaudi* (J. PÉREZ).

Eumenes alluaudi J. PÉREZ, Ann. Soc. ent. France, LXIV, 1895, p. 206 (♀ ♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 21. P. CAMERON, Trans. Linn. Soc. London, (2) XII, Zool., pt. 1, 1907, p. 71. G. MEADE WALDO, Trans. Linn. Soc. London, (2), XV, Zool., pt. 1, 1912, p. 43.

Seychelles Islands.—Type locality: "Mahé."

13b. var. *asinus* (H. DE SAUSSURE) A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 24 (♀).

Eumenes asina H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 59; Pl. XI, fig. 1 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 27. DALLA TORRE, Cat., IX, Vesp., 1894, p. 18; Gen. Ins. Vesp., 1904, p. 21.

Senegal.—Type locality: "le Sénégal."

13c. var. *concinus* (H. DE SAUSSURE) A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 17 (♀ ♂).

Eumenes concinnus H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 144 (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 25. GRIBODO, Ann. Mus. civ. Genova, XXI, 1884, p. 293 (♀). MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 611 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 22; Gen. Ins. Vesp., 1904, p. 22.

Eumenes sanguinolenta GERSTÆCKER, Monatsb. k. Preuss. Ak. Wiss. Berlin, 1857, p. 463 (♂); in Peters, Reise n. Mossambique, Zool., V, 1862, p. 464; Pl. xxx, fig. 3 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 31; Gen. Ins. Vesp., 1904, p. 24. F. KOHL, Jahrb. Hamburg. Wiss. Anst., X, 2, (1892), 1893, p. 189 (♀).

Eumenes spilocera P. CAMERON, Ann. Transvaal Mus., II, 3, 1910, p. 159 (♀). (See A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 14).

Nubia, Abyssinia, Mozambique, Transvaal.—Type locality: "la Nubie."

13d. var. *guerini* (H. DE SAUSSURE).

Eumenes guerini H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 62 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 28. DALLA TORRE, Cat., IX, Vesp., 1894, p. 25; Gen. Ins. Vesp., 1904, p. 23.

Eumenes sakalava H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 235 (♀ ♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 24.

Eumenes lepelletieri var. *sakalavus* (H. DE SAUSSURE) A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 17 (♀ ♂).

Madagascar.—Type locality: "Madagascar."

13e. var. *hottentottus* (H. DE SAUSSURE) A. v. SCHULTHESS, Deutsche entom. Zeitschr., 1914, p. 291 (♀ ♂).

Eumenes hottentotta H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 63 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 26. DALLA TORRE, Cat., IX, Vesp., 1894, p. 25; Gen. Ins. Vesp., 1904, p. 23. A. v. SCHULTHESS, Wiss. Ergebn. D. Z. Afrik. Exp. (1907-08), IV, Lf. 10, 1912, p. 292; Soc. entomol., XXV, 1910, p. 24.

Eumenes dyscheroides GRIBODO, Mem. Ac. Sc. Bologna, Sc. natur., (5), V, 2, 1895, p. 93 (♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 22.

Eumenes lepelletieri var. *dyscheroides* A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 17.

Cape Colony, Natal, Delagoa Bay, Belgian Congo.—Type locality: "le Cap de Bonne-Espérance."

13f. var. *pensilis* (H. DE SAUSSURE) A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 17 (♀ ♂).

Eumenes pensilis H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 155; Pl. iv, fig. 10; Pl. xvii, fig. 7 (♀ ♂); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 234. DALLA TORRE, Cat., IX, Vesp., 1894, p. 28; Gen. Ins. Vesp., 1904, p. 24. A. v. SCHULTHESS, Reise Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 71.

Madagascar.—Type locality: "Fianarantsoa."

13g. var. *stuhlmanni* A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 18 (♀). German East Africa, eastern Belgian Congo.—Type locality: "Deutsch Ost-Afrika."

13h. var. *tessmanni* A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 18 (♀ ♂); Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 342.

Eumenes cameruna F. Kohl, in litt. (teste A. v. Schulthess).

Spanish Guinea.—Type locality: "Spanish Guinea, Benito."

14. *Eumenes leptogaster* WALKER, List Hym. Egypt, 1871, p. 30 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 26; Gen. Ins. Vesp., 1904, p. 23.

Arabia.—Type locality: "Wâdy Ferran."

15. *Eumenes lucasius* H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 68 (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 27. DALLA TORRE, Cat., IX, Vesp., 1894, p. 26; Gen. Ins. Vesp., 1904, p. 23. C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), X, 1902, p. 220. A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 24 (♀ ♂); Ark. f. Zool., VIII, No. 17, 1913, p. 14. P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, pp. 175 and 178 (♀ ♂); Ann. Transvaal Mus., II, 3, 1910, pp. 156 and 160.

Rethus broomi P. CAMERON, Rec. Albany Mus., I, 2, 1904, p. 110 [See G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XIV, 1914, p. 404].

Eumenes schultzeanus A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 19 (♀ ♂).

Abyssinia, East Africa, Zanzibar, Nyasaland, Bechuanaland, Transvaal, Cape Colony.—Type locality: "l'Abyssinie."

16. *Eumenes maculinodus* P. CAMERON, Ann. Transvaal Mus., II, 3, 1910, p. 156 (♂).

Transvaal.—Type locality: "Pretoria."

Perhaps the male of *E. ornativentris* Cameron.

17. ***Eumenes maxillosus*** (DE GEER) H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 153 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 26; Gen. Ins. Vesp., 1904, p. 23. Fox, Proc. Ac. Nat. Sc. Philadelphia, XLVIII, 1896, p. 554. MAGRETTI, Ann. Mus. civ. Genova, (2), XIX, 1898, p. 393. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 28 (ethology). A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 271; Reise Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 71; Zool. Jahrb. Abt. f. Syst., XXVII, Heft 5, 1909, p. 445; Soc. entomol., XXV, 1910, p. 17; Wiss. Ergebn. D. Z. Afrika Exp. (1907-08), IV, Lf. 10, 1912, p. 292; Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 342; Deutsche entom. Zeitschr., 1914, p. 290. C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), X, 1902, p. 219; Trans. Zool. Soc. London, XIX, 2, 1909, p. 181. F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 224. P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, pp. 175 and 177; Ann. Transvaal Mus., II, 3, 1910, p. 156. W. A. SCHULZ, Berliner ent. Zeitschr., LVII, 1912, pp. 60 and 87. F. MAIDL, Sitz. Ber. k. Ak. Wiss. Wien, math. naturw. Kl., CXXII, Heft 4, 1913, Abt. I, p. 558. L. SCHUSTER, Zeitschr. wiss. Insektenbiol., VII, 1911, p. 27 (ethology). G. MANTERO, Ann. Mus. civ. Genova, XLVI, (1914), 1915, pp. 308 and 327. A. TULLGREN, Ark. f. Zool., I, 1904, p. 445.

Vespa maxillosa DE GEER, Mém. Hist. Ins., III, 1773, p. 577; Pl. xxix, figs. 1-2.

Sphecx tinctor CHRIST, Naturg. d. Insect., 1791, p. 311; Pl. xxxi, fig. 1.

Eumenes tinctor H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 49 (♀ ♂). F. SMITH, Trans. Ent. Soc. London, (2), III, 1856, Proc., p. 128 (ethology); Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 27; Pl. vi, fig. 1. GUEINZIUS, Trans. Ent. Soc. London, (2), V, 1858, p. 9 (ethology). GERSTÆCKER, in Peters, Reise n. Mossambique, Zool., V, 1862, p. 462; in v. d. Decken's Reisen in Ost-Afrika, III, 2, Gliederth., 1873, p. 321; Arch. f. Naturg., XXXVII, 1, 1871, p. 330. v. HEYDEN, Berliner ent. Zeitschr., XI, 1867, p. 398. WALKER, List Hym. Egypt, 1871, p. 29. RADOSZKOWSKY, Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 203. ED. ANDRÉ, Spéc. Hym. Eur. Algér., II, fasc. 21-23, 1884, p. 630 (ethology). GRIBODO, Ann. Mus. civ. Genova, XXI, 1884, p. 293; Mem. Ac. Sc. Bologna, Sc. natur., (5), IV, 1894, p. 62; (5), V, 1895, p. 91. MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 609 (ethology); (2), X, 1891, p. 959. A. SCHLETTERER, Ann. Soc. ent. Belgique, XXXV, 1891, p. 19. W. L. DISTANT, A Naturalist in the Transvaal, 1892, p. 210. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 343; in O. Baumann, Durch Massailand zur Nilquelle, 1894, p. 350. C. T. BINGHAM, Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 109. MORICE, Res. Swed. Zool. Exp. Jägerskiöld, pt. I, 1904, Hym. acul., p. 3. E. ZAVATTARI, Boll. Mus. Zool. Anat. comp. Torino, XXII, No. 548, 1907, p. 1; No. 555, 1907, p. 3. R. DU BUYSSON, Bull. Soc. ent. France, 1908, p. 135; in A. Chevalier, L'Afrique centrale française, 1908, p. 707; Résultats scientif. Voy. Afrique d'Ed. Foá, 1908, p. 593; Act. Soc. Linn. Bordeaux, LXIV, 1910, p. 227. E. ROUBAUD, C. R. Ac. Sc. Paris, CLIII, 1911, pp. 476-480 (ethology); Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 43-60 (ethology).

SAVIGNY, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. viii, fig. 4.

Eumenes savignyi GUÉRIN, Icon. Règne Animal, II, Atlas, 1835, Pl. lxxii, figs. 4 and 4 a-d; III (Texte), Ins., 1844, p. 446; in Lefebvre, Voy. en Abyssinie, IV, Zool., pt. 6, 1848, p. 363. SPINOLA, Ann. Soc. ent. France, VII, 1838, p. 503 (♀ ♂). WALKER, List Hym. Egypt, 1871, p. 29.

Vespa guineensis FABRICIUS, Entom. Syst., II, 1793, p. 277 (see W. A. Schulz, Berliner ent. Zeitschr., LVII, 1912, p. 87).

Zethus guineensis FABRICIUS, Syst. Piez., 1804, p. 283.

Eumenes erythrospila P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, pp. 175 and 178 (♀ ♂). (See A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 14, and G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 51).

The typical "*maxillosus*" is widely distributed over the Ethiopian part of the African continent and the Malagasy subregion: Tripoli, Egypt, White Nile, Abyssinia, Somaliland, East Africa, Mozambique, Transvaal, Natal, Nyasaland, Angola, Belgian Congo, Mt. Ruwenzori (3000-7000 ft.), Gaboon, Spanish Guinea, Liberia, Upper Niger, Senegal, Mauritania, Central Sahara, Madagascar, Comoro Islands, Southern Arabia.—Type locality: "Surinam."

17a. var. **dimidiatipennis** (H. DE SAUSSURE) A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 17 (♀ ♂).

Eumenes dimidiatipennis H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 51 (♀ ♂); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 154. ED. ANDRÉ, Spéc. Hym. Eur. Algér., II, fasc. 21-23, 1884, p. 631. MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 610; (2), XIX, 1898, p. 593. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 25. WALKER, List Hym. Egypt, 1871, p. 29. RADOSZKOWSKY, Hor. Soc. ent. Rossicæ, XII, 2, 1876, p. 141. A. v. SCHULTHESS, Entom. Nachr., XIX, 1893, p. 18. W. F. KIRBY, Nat. Hist. of Sokotra by H. O. Forbes, Zool. Hym., 1903, p. 246. FOX, Proc. Ac. Nat. Sc. Philadelphia, XLVIII, 1896, p. 554. MORICE, Res. Swed. Zool. Exp. Jägerskiöld, pt. I, 1904, Hym. acul., p. 3; Novit. Zoolog., XX, 3, 1913, p. 599; XXIII, 2, 1916, p. 242. C. T. BINGHAM, Fauna of Brit. India, Hym., I, 1897, p. 342, fig. 96; Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 109. F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 224. R. DU BUYSSON, Bull. Soc. ent. France, 1908, pp. 134 and 135. F. MAIDL., Sitz. Ber. k. Ak. Wiss. Wien, math. naturw. Kl., CXXII, Abt. I, Heft 4, 1913, p. 558. DALLA TORRE, Cat., IX, Vesp., 1894, p. 22; Gen. Ins. Vesp., 1904, p. 22.

SAVIGNY, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. VIII, fig. 5 (♀ and ♂).

Egypt, White Nile, Abyssinia, Somaliland, Sokotra Island, Central Sahara, Southern Algeria (Ain Sefra), Madagascar (?), Southern Arabia, India, Syria.—Type locality: "Djidda."

17b. var. **fenestralis** (H. DE SAUSSURE) A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 17 (♀ ♂); Deutsche entom. Zeitschr., 1914, p. 290.

Eumenes fenestralis H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 53; Pl. x, fig. 6 (♀ ♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 27. DESMAREST, in Chenu, Encycl. Hist. nat. Animaux, 1860, p. 143, fig. 123. v. HEYDEN, Berliner ent. Zeitschr., XI, 1867, p. 398. WALKER, List Hym. Egypt, 1871, p. 29. G. GRIBODO, Ann. Mus. civ. Genova, XXI, 1884, p. 293; Mem. Ac. Sc. Bologna, Sc. natur., (5), V, 2, 1895, p. 92. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 343. DALLA TORRE, Cat., IX, Vesp., 1894, p. 24; Gen. Ins. Vesp., 1904, p. 22. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 29. A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 271. C. T. BINGHAM, Trans. Zool. Soc. London, XIX, 2, 1909, p. 181.

Eumenes fenestratus RADOSZKOWSKY, Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 203.

Eumenes variventris P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, pp. 175 and 180 (♂) [See A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 14; G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 51].

Senegal, Belgian Congo, Angola, East Africa, Zanzibar, Mt. Ruwenzori (7000 ft.).—Type locality: "le Congo."

17c. var. **petiolatus** (FABRICIUS).

Eumenes petiolata (FABRICIUS) H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 47 (♀ ♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 26. DALLA TORRE, Cat., IX, Vesp., 1894, p. 28; Gen. Ins. Vesp., 1904, p. 24.

Vespa petiolata FABRICIUS, Spec. Insect., I, 1781, p. 467.

Eumenes latreillei H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 51 (♀).

This Oriental and Australian variety was recorded by Smith from the Cape of Good Hope, probably by mistake; the record, however, is reproduced in Dalla Torre's List.

17d. var. **pulcherrimus** A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 17 (♀).

East Africa, from the Equator to Natal. Type locality: "Ost-Afrika."

17e. var. **reginus** (H. DE SAUSSURE) A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 17 (♀ ♂).

Eumenes regina H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 49; Pl. x, figs. 8, 8 a-b (♀); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 154 (♀ ♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 28. DALLA TORRE, Cat., IX, Vesp., 1894, p. 31; Gen. Ins. Vesp., 1904, p. 24. A. v. SCHULTHESS, Reise Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 71, fig. 9 (ethology).

Eumenes kohli H. BRANCSIK, Jahresheft naturw. Ver. Trencsiner Comit., XIII-XIV, 1891, p. 159 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 26; Gen. Ins. Vesp., 1904, p. 23.

Madagascar, Nossi Bé.—Type locality: "Madagascar."

17f. var. **tropicalis** (H. DE SAUSSURE) A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 17 (♀ ♂); Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 342; Deutsche entom. Zeitschr., 1914, p. 290.

Eumenes tropicalis H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 54 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 32; Gen. Ins. Vesp., 1904, p. 25. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 343. A. TULLGREN, Ark. f. Zool., I, 1904, p. 445.

Eumenes tropica F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 27.

Senegal, Cameroon, Spanish Guinea, Belgian Congo.—Type locality: "le Sénégal."

18. **Eumenes melanosomus** H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 61; Pl. XII, fig. 1 (♀ ♂). MAINDRON, Ann. Soc. ent. France, (6), II, 1882, p. 272. DALLA TORRE, Cat., IX, Vesp., 1894, p. 27; Gen. Ins. Vesp., 1904, p. 23. A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 17; Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 342. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 25.

Distribution of the typical form: Tropical East and West Africa; (Java?).—Type locality: "Java."

18a. var. **æthiopicus** (H. DE SAUSSURE) A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 18 (♀).

Eumenes æthiopica H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 62 (♀).

F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 27. DALLA TORRE, Cat., IX, Vesp., 1894, p. 17; Gen. Ins. Vesp., 1904, p. 21. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 343.

Gaboon, Belgian Congo.—Type locality: "le Congo."

18b. var. **affinis** A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 18 (♀ ♂).

Eumenes xanthaspis P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 175 (♂) (See A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 14.)

German East Africa.—Type locality: "Dar-es-Salaam."

18c. var. **aterrimus** A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 18 (♀).

Eumenes aterrima A. v. SCHULTHESS, Wiss. Ergebn. D. Z. Afrik. Exp., (1907-08), IV, Lf. 10, 1912, p. 292 (♂).

Togo, Cameroon, Belgian Congo, Mt. Ruwenzori (1900 m.), Nyasaland, Zanzibar.—Type locality: "Togo."

18d. var. **decipiens** (KIRBY) A. v. SCHULTHESS, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 342 (♀ ♂); Deutsche entom. Zeitschr., 1914, p. 291.

Eumenes decipiens W. F. KIRBY, Ann. Mag. Nat. Hist., (6), XVIII, 1896, p. 265. DALLA TORRE, Gen. Ins. Vesp., 1904, p. 22.

Eumenes gracillima A. TULLGREN, Ark. f. Zool., I, 1904, p. 445; Pl. xxiii, fig. 8 (♂).

Eumenes moseri W. A. SCHULZ, Spolia Hymenopterologica, 1906, p. 315, figs. 11 a-c (♀); Berliner ent. Zeitschr., LI, Heft 4, 1907, p. 325.

Sierra Leone, Cameroon, Fernando Po, Spanish Guinea, Ogowe River, Belgian Congo.—Type locality: "River Ogové."

18e. var. **distinctus** (H. DE SAUSSURE) A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 17 (♂).

Eumenes distinctus H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 143 (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 26. DALLA TORRE, Cat., IX, Vesp., 1894, p. 22; Gen. Ins. Vesp., 1904, p. 22.

Eumenes walkeri C. RITSEMA, Tijdschr. v. Entom., XVII, 1874, p. 199; Pl. xi, fig. 7 (♂). A. SCHLETTERER, Ann. Soc. ent. Belgique, XXXV, 1891, p. 19; Pl. I, fig. 8 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 33; Gen. Ins. Vesp., 1904, p. 25. W. A. SCHULZ, Berliner ent. Zeitschr., LI, Heft 4, 1907, p. 313, fig. 3 (♂).

Belgian Congo.—Type locality: "l'Afrique."

18f. var. **longirostris** (GERSTÄCKER) A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 17 (♀ ♂).

Eumenes longirostris GERSTÄCKER, Monatsb. k. Preuss. Ak. Wiss. Berlin, 1857, p. 462 (♂); in Peters, Reise n. Mossambique, Zool., V, 1862, p. 462; Pl. xxx, fig. 1. DALLA TORRE, Cat., IX, Vesp., 1894, p. 26; Gen. Ins. Vesp., 1904, p. 23. GRIBODO, Mem. Ac. Sc. Bologna, Sc. natur., (5), V, 2, 1895, p. 92 (♀). A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 271.

Eumenes erythraspis P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, pp. 175 and 179 (♀). Synonym according to A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 14.

Eastern Belgian Congo (Semliki River), German East Africa, Mozambique.—Type locality: "Mossambique."

19. **Eumenes ornativentris** P. CAMERON, Ann. Transvaal Mus., II, 3, 1910, p. 157 (♀).

Transvaal.—Type locality: "Waterval."

Is possibly the female of *E. maculinodus* Cameron.

20. **Eumenes peringeyanus** A. v. SCHULTHESS, Soc. entomol., XXVIII, 1913, p. 2 (♀).

Cape Colony.— Type locality: "Kapkolonie."

21. **Eumenes phthisicus** GERSTÆCKER, Monatsb. k. Ak. Wiss. Berlin, 1857, p. 463 (♂); in Peters, Reise n. Mossambique, Zool., V, 1862, p. 463; Pl. xxx, fig. 2 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 28; Gen. Ins. Vesp., 1904, p. 24. A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 17.

Mozambique.— Type locality: "Mossambique."

22. **Eumenes rendalli** C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), X, 1902, p. 220 (♀ ♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 24.

Nyasaland, Transvaal.— Type locality: "Fort Johnston, Nyasaland."

23. **Eumenes rufolineatus** P. CAMERON, Rec. Albany Mus., I, 4, 1905, p. 206 (♂); Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 181; Ann. Transvaal Mus., II, 3, 1910, p. 156.

Cape Colony, Transvaal.— Type locality: "Brak Kloof."

24. **Eumenes signicornis** WALKER, List Hym. Egypt, 1871, p. 30.

Eumenes signaticornis DALLA TORRE, Cat., IX, Vesp., 1894, p. 32; Gen. Ins. Vesp., 1904, p. 25.

Eritrea.— Type locality: "Massowah."

25. **Eumenes sulcigaster** GRIBODO, Ann. Mus. civ. Genova, XXI, 1884, p. 295 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 32; Gen. Ins. Vesp., 1904, p. 25.

Abyssinia.— Type locality: "Giagaguè, Scioa."

15. **Pachymenes** H. DE SAUSSURE

Et. fam. Vesp., I, Eum., 1852, p. 73.

Eudiscalius H. FRIESE, Zeitschr. syst. Hym. Dipt., IV, 1904, p. 16.

Euchalcomenes R. E. TURNER, Trans. Ent. Soc. London, 1908, p. 90.

Genotype: *Pachymenes sericeus* H. de Saussure, 1852.

1. **Pachymenes astutus** (F. KOHL).

Labus astutus F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, pp. 230 and 245; Pl. iv, fig. 17; Pl. vi, figs. 2 and 24; Pl. vii, figs. 7 and 17 (♀).

Cape Colony, Belgian Congo.— Type locality: "Kapland."

2. **Pachymenes congensis** J. BEQUAERT. See p. 88 (♀ ♂).

Belgian Congo.— Type locality: Banana.

3. **Pachymenes crassinodus** (P. CAMERON).

Eumenes crassinodus P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, pp. 175 and 181 (♀).

Labus crassinodus G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 51.

Nortonia crassinoda A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, pp. 14 and 18.

East Africa.— Type locality: "Kilimandjaro: Kibonoto, 1000–1300 m."

4. **Pachymenes curvirufolineatus** (P. CAMERON).

Odynerus curvirufolineatus P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 191 (♂). G. MEADE WALDO, Ann. Mag. Nat. Hist., (8),

XI, 1913, p. 53; Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 496. A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 17.

East Africa.—Type locality: "Kilimandjaro: lower Kibonoto."

5. **Pachymenes eumenoides** (F. SMITH).

Odynerus eumenoides F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 71 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 66; Gen. Ins. Vesp., 1904, p. 44. C. T. BINGHAM, Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 110; Ann. Mag. Nat. Hist., (7), XII, 1903, p. 68.

Nortonia eumenoides G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 503.

Natal, Transvaal, Southern Arabia.—Type locality: "Port Natal."

6. **Pachymenes finitimus** (F. KOHL).

Labus finitimus F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, pp. 229 and 243; Pl. vi, fig. 22; Pl. vii, figs. 1 and 15 (♀).

Cape Colony.—Type locality: "Kapland."

7. **Pachymenes fraterculus** (F. KOHL).

Labus fraterculus F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, pp. 225 and 243; Pl. iv, fig. 27; Pl. vi, figs. 8, 10, and 25; Pl. vii, figs. 9 and 24 (♀ ♂).

Sokotra Island.—Type locality: "Ras Shoab."

8. **Pachymenes lævis** (A. v. SCHULTHESS).

Nortonia lævis A. v. SCHULTHESS, Verh. k. k. z. bot. Ges. Wien, LIII, 1903, p. 363 (♂); Zeitschr. syst. Hym. Dipt., IV, 1904, p. 279. DALLA TORRE, Gen. Ins. Vesp., 1904, p. 32. F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 241 (♂).

San Thomé Island.—Type locality: "Insel St. Thomé."

9. **Pachymenes nigritus** (F. KOHL).

Labus nigritus F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, pp. 228 and 244; Pl. vi, figs. 6 and 21; Pl. vii, figs. 3 and 14 (♀).

Cape Colony.—Type locality: "Kapland."

10. **Pachymenes rufoqueadripustulatus** (P. CAMERON).

Odynerus rufoqueadripustulatus P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 189 (♀). G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 53.

Nortonia rufoqueadripustulata A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 18.

Mt. Kilimandjaro.—Type locality: "Kilimandjaro: Kibonoto, 1300-1900 m."

11. **Pachymenes schultheesianus** (H. DE SAUSSURE).

Nortonia schultheessiana H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 157; Pl. xvii, fig. 8 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 109; Gen. Ins. Vesp., 1904, p. 32. A. v. SCHULTHESS, Zeitschr. syst. Hym. Dipt., IV, 1904, p. 279. F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, pp. 233 and 244; Pl. iv, fig. 26; Pl. vi, figs. 1 and 28; Pl. vii, figs. 12 and 18 (♂).

Madagascar, Nossi Bé.—Type locality: "Madagascar."

12. **Pachymenes socotræ** (F. KOHL).

Labus socotræ F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, pp. 226 and 243; Pl. vi, figs. 11 and 16; Pl. vii, fig. 25 (♀).

?*Icaria grossepunctata* W. F. KIRBY, Bull. Liverpool Mus., III, 1900, p. 20 (♀); Nat. Hist. of Sokotra by H. O. Forbes, Zool. Hym., 1903, p. 249; Pl. xvi, fig. 5 (♀).

Sokotra Island.— Type locality: "Ras Shoab."

13. **Pachymenes transiens** (F. KOHL).

Labus transiens F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, pp. 231 and 244; Pl. iv, fig. 18; Pl. vi, fig. 12; Pl. vii, fig. 8 (♀).

South Africa.— Type locality: "Montagu Pass."

16. **Pseudochilus** H. DE SAUSSURE

Et. fam. Vesp., III, Suppl., 1854, p. 321.

Genotype: *Pterochilus glabripalpis* H. de Saussure, 1852.

1. **Pseudochilus glabripalpis** H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 321 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 109; Gen. Ins. Vesp., 1904, p. 57; Pl. iv, figs. 6 a-c.

Pterochilus glabripalpis H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 239; Pl. xx, fig. 7 and 7 a-b (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 86. Senegal, Gambia.— Type locality: "le Sénégal."

17. **Nortonia** H. DE SAUSSURE

Entom. Zeitg. Stettin, XXX, 1869, p. 53.

Genotype: *Odynerus intermedius* H. de Saussure, 1852.

1. **Nortonia aberratica** (MORICE).

Odynerus aberraticus F. D. MORICE, Ann. Mag. Nat. Hist., (7), XII, 1903, p. 613 (♂); Res. Swed. Zool. Exp. Jägerskiöld, pt. I, No. 14, 1904, Hym. Acul., p. 4 (♂).

Nortonia moricei F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, I, 1907, pp. 233 and 245; Pl. vi, figs. 18 and 20; Pl. vii, figs. 10 and 19 (♂). F. MAIDL, Sitz. Ber. k. Ak. Wiss. Wien, math. naturw. Kl., CXXII, Heft 4, 1913, Abt. 1, p. 558, fig. (♀).

Egypt (Aba Island, Kairo).— Type locality: "Aba Island."

The types of *O. aberraticus* Morice and *N. moricei* Kohl were collected the same day and in the same locality; a comparison of the descriptions leaves no doubt that both refer to one species.

2. **Nortonia acarophila** J. BEQUAERT. See p. 97 (♀).

Belgian Congo.— Type locality: Faradje.

3. **Nortonia ægyptiaca** (H. DE SAUSSURE).

Odynerus ægyptiacus H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 210; Pl. ii, fig. 19 (♀). ED. ANDRÉ, Spéc. Hym. Eur. Algér., II, fasc. 21-23, 1884, p. 664 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 50; Gen. Ins. Vesp., 1904, p. 39.

SAVIGNY, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. viii, fig. 15 (♀).

Egypt.— Type locality: "Egypte."

Perhaps the same species as *N. heydeniana* (Saussure).

4. **Nortonia bisuturalis** (H. DE SAUSSURE).

Odynerus bisuturalis H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 127 (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 72. DALLA TORRE, Cat., IX, Vesp., 1894, p. 57; Gen. Ins. Vesp., 1904, p. 41.

Labus bisuturalis G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 501 (♂).

(Senegal ?), Belgian Congo.— Type locality: "le Sénégal?"

5. **Nortonia braunsii** F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, I, 1907, pp. 234 and 245; Pl. iv, figs. 19 and 31; Pl. vi, figs. 9, 14, and 19; Pl. vii, fig. 5 (♀ ♂).

Cape Colony, Belgian Congo.— Type locality: "Algoabai."

6. **Nortonia caffra** (G. MEADE WALDO).

Labus caffra G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 453 (♀).

Zululand.— Type locality: "Zulu."

7. **Nortonia difformis** (H. DE SAUSSURE).

Odynerus difformis H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 145; Pl. xvi, figs. 11 and 11a (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 72. DALLA TORRE, Cat., IX, Vesp., 1894, p. 64; Gen. Ins. Vesp., 1904, p. 44.

Labus difformis G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 502.

?SAVIGNY, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. viii, fig. 11 (♂).

Senegal.— Type locality: "le Sénégal."

8. **Nortonia fragosa** F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, I, 1907, pp. 237 and 246; Pl. viii, figs. 23 to 27 (♂).

Belgian Congo.— Type locality: "Boma."

9. **Nortonia gambiensis** (G. MEADE WALDO).

Labus gambiensis G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 454 (♀).

Gambia, Nyasaland.— Type locality: "Dunajoe, Gambia."

10. **Nortonia heydeniana** (H. DE SAUSSURE).

Odynerus heydenianus H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 211; Pl. II, fig. 20 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 72; Gen. Ins. Vesp., 1904, p. 46. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 486.

Abyssinia.— Type locality: "Massana."

Probably a synonym of *N. ægyptiaca* (Saussure).

11. **Nortonia kibonotensis** (P. CAMERON).

Odynerus kibonotensis P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 192 (♀). G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 52; Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 490.

Nortonia kibonotoensis A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 18. East Africa.— Type locality: "Kilimandjaro: Kibonoto, 1000-1200 m."

12. **Nortonia maculiscapa** (P. CAMERON).

Odynerus maculiscapus P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 194 (♂). G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 52; Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 490. A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 15.

East Africa.— Type locality: "Kilimandjaro: Kibonoto, 1300-1900 m."

13. **Nortonia malelensis** J. BEQUAERT. See p. 109 (♂).

Belgian Congo.— Type locality: Malela.

14. **Nortonia morula** F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, I, 1907, pp. 236 and 246; Pl. iv, figs. 23 and 25; Pl. vi, figs. 7 and 15; Pl. vii, fig. 16 (♀ ♂).

Gaboon, Belgian Congo.—Type locality: "Gabun."

15. **Nortonia parvula** (H. DE SAUSSURE).

Leptochilus parvulus H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 237 (♀ ♂) (without description).

Odynerus parvulus H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 321.

SAVIGNY, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. VIII, fig. 14 (♀ ♂).

Odynerus invisus DALLA TORRE, Cat., IX, Vesp., 1894, p. 74; Gen. Ins. Vesp., 1904, p. 47.

Egypt.—Type locality: "Egypte."

The species is distinct from *Odynerus parvulus* LEPELETIER, Hist. nat. Ins. Hym., II, 1841, p. 631, which belongs to the subgenus *Ryggchium*.

16. **Nortonia polydora** F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, pp. 235 and 245; Pl. IV, fig. 30; Pl. VI, figs. 13 and 17; Pl. VII, figs. 4 and 20 (♀).

Senegambia, Belgian Congo.—Type locality: "Senegambien."

17. **Nortonia soror** F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, pp. 237 and 246; Pl. IV, figs. 22 and 24; Pl. VI, fig. 4 (♂).

Orange Free State.—Type locality: "Bothaville."

18. **Nortonia tricarunculata** J. BEQUAERT. See p. 99 (♀ ♂).

Belgian Congo.—Type locality: Lubutu.

18. **Ancistrocerus** WESMAEL.

Bull. Ac. Sc. Belgique, III, 1836, p. 45 (as a subgenus). WESTWOOD, Introduct. to Mod. Class. of Ins., II, Synopsis, 1840, p. 84 (as a genus).

Genotype: *Vespa parietum* Linné, 1758 (= *Vespa parietina* Linné, 1761).

Ancistrocerus parietum (LINNÉ) is a Palearctic species which was erroneously recorded from West Africa by Dalla Torre, Gen. Ins. Vesp., 1904, p. 51.

1. **Ancistrocerus biphaleratus** (H. DE SAUSSURE).

Odynerus biphaleratus H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 134; Pl. XVI, fig. 2 (♀ ♂); III, Suppl., 1854, p. 204. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 70. ED. ANDRÉ, Spéc. Hym. Eur. Algér., II, fasc. 21–23, 1884, p. 677 (♀ ♂). C. T. BINGHAM, Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 110. DALLA TORRE, Cat., IX, Vesp., 1894, p. 56; Gen. Ins. Vesp., 1904, p. 41.

SAVIGNY, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. IX, fig. 6 (♀).

Southern Arabia, Egypt.—Type locality: "l'Egypte."

2. **Ancistrocerus budongo** (G. MEADE WALDO).

Odynerus budongo G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 489 and 498 (♀).

Uganda, Belgian Congo.—Type locality: "Budongo Forest, Unyoro."

3. **Ancistrocerus capensis** (H. DE SAUSSURE).

Odynerus capensis H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 214 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 71. DALLA TORRE, Cat., IX, Vesp., 1894, p. 58; Gen. Ins. Vesp., 1904, p. 41. C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), X, 1902, p. 221.

Cape Colony, Transvaal.—Type locality: "le Cap de Bonne-Espérance."

4. **Ancistrocerus gowdeyanus** (G. MEADE WALDO).

Odynerus gowdeyanus G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 457 (♂); Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 489.

Uganda.— Type locality: "Entebbe."

5. **Ancistrocerus imbecillus** (H. DE SAUSSURE).

Odynerus imbecillus H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 126 (♂); III, Suppl., 1854, p. 197. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 72. DALLA TORRE, Cat., IX, Vesp., 1894, p. 73; Gen. Ins. Vesp., 1904, p. 47.

Sierra Leone (originally described from Java).— Type locality: "Sierra Leone."

6. **Ancistrocerus impunctatus** (SPINOLA).

Odynerus impunctatus SPINOLA, Ann. Soc. ent. France, VII, 1838, p. 503 (♂). H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 213 (♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 214 (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 69. ED. ANDRÉ, Spéc. Hym. Eur. Algér., II, fasc. 21–23, 1884, p. 677 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 73; Gen. Ins. Vesp., 1904, p. 47.

SAVIGNY, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. ix, fig. 5 (♂).

Egypt.— Type locality: "Egypte."

7. **Ancistrocerus inconstans** (H. DE SAUSSURE).

Odynerus inconstans H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 217; Pl. II, fig. 24 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 74; Gen. Ins. Vesp., 1904, p. 47. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 490.

Abyssinia.— Type locality: "Abyssinie."

8. **Ancistrocerus kisangani** J. BEQUAERT. See p. 115 (♂).

Belgian Congo.— Type locality: Stanleyville.

9. **Ancistrocerus lineaticollis** P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 193 (♀ ♂).

Odynerus lineaticollis G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 52; Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 490. A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 15.

East Africa.— Type locality: "Meru, rain forest, 3500 m."

9a. var. **rufopictus** (G. MEADE WALDO).

Odynerus lineaticollis var. *rufopictus* G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 490.

Africa.— Type locality: unknown.

10. **Ancistrocerus lufiræ** (G. MEADE WALDO).

Odynerus lufiræ G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, pp. 490 and 499 (♀ ♂).

Southeastern Belgian Congo (Katanga).— Type locality: "Kambove, 4000–5000 ft."

11. **Ancistrocerus massaicus** (P. CAMERON).

Odynerus massaicus P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 193 (♀). G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 52; Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 489. A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 14.

East Africa, Belgian Congo.— Type locality: "Kilimandjaro: Kibonoto, 1300–1900 m."

12. **Ancistrocerus massanensis** (H. DE SAUSSURE).

Odynerus massanensis H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 213; Pl. II, figs. 22 and 22 t (♀). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 490; Pl. xci, fig. 1 (♂).

Odynerus massauensis MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 621. DALLA TORRE, Cat., IX, Vesp., 1894, p. 77; Gen. Ins. Vesp., 1904, p. 49.

Abyssinia.— Type locality: "Massana."

13. **Ancistrocerus neavei** (G. MEADE WALDO).

Odynerus neavei G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 490 and 500 (♀ ♂).

Mt. Ruwenzori (1600-8500 feet; Uganda and Belgian Congo) — Type locality: "N. Ruwenzori, 6000-8500 ft."

14. **Ancistrocerus neuvillei** (R. DU BUYSSON).

Odynerus neuvillei R. DU BUYSSON, Rev. d'Ent. Caen, XXV, 1906, p. 109 (♂).

G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 490.

British East Africa.— Type locality: "Escarpment."

15. **Ancistrocerus pharao** (H. DE SAUSSURE).

Odynerus pharao H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 212; Pl. II, fig. 21 (♀ ♂). ED. ANDRÉ, Spéc. Hym. Eur. Algér., II, fasc. 21-23, 1884, p. 669 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 89; Gen. Ins. Vesp., 1904, p. 51.

Egypt.— Type locality: "Egypte."

16. **Ancistrocerus roubaudi** (J. BEQUAERT).

Odynerus roubaudi J. BEQUAERT, Bull. Soc. ent. France, 1916, p. 90 (♀ ♂).

E. ROUBAUD, Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 36 and 37 (ethology).

Upper Senegal-Niger.— Type locality: "Koulikoro."¹

This is probably only a color variety of *A. massanensis* (Saussure); however, I was unable to compare it with that species.

17. **Ancistrocerus striativentris** (P. CAMERON).

Nortonia striativentris P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 194 (♂).

Odynerus striativentris G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 52; Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 490. A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 15.

East Africa.— Type locality: "Kilimandjaro: Kiboscho, 3000-4000 m."

18. **Ancistrocerus zairensis** J. BEQUAERT. See p. 117 (♀ ♂).

Belgian Congo.— Type locality: Banana.

19. **Ancistrocerus zebra** (H. DE SAUSSURE).

Odynerus zebra H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 215; Pl. II, fig. 23 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 105; Gen. Ins. Vesp., 1904, p. 57. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 490.

Abyssinia.— Type locality: "Simen."

19. **Montezumia** H. DE SAUSSURE

Et. fam. Vesp., I, Eum., 1852, p. 87.

Genotype: *Odynerus ? azurescens* Spinola, 1851, var. *rufidentata* (Saussure), 1852.

1. **Montezumia bimaculata** G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 455 (♀).

North East Rhodesia.— Type locality: "on road Fort Jameson to Lundazi (4000 ft.)."

This species belongs probably to the genus *Parazumia* H. de Saussure.

¹ The holo- and allotype of *A. roubaudi* (J. Bequaert) have been deposited in the American Museum.

20. **Odynerus** LATREILLE

Hist. nat. Crust. Ins., III, 1802, p. 362.

Genotype: *Vespa spinipes* Linné, 1758.

The following species of *Odynerus* were erroneously recorded from the Ethiopian region: *O. bicinctus* (Fabricius) from the islands of the Pacific (South Africa, according to Fabricius, Spec. Insect., I, 1781, p. 465); *O. herrichii* Saussure from the Palearctic region (West Africa, according to Dalla Torre, Gen. Ins. Vesp., 1904, p. 46); *O. nudus* Morawitz from Central Asia (Central Africa, according to Dalla Torre, *op. cit.*, 1904, p. 50); *O. miniatus* Saussure from the East Indies (Senegal, according to Smith, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 73); *O. rectus* Dalla Torre from Spain (Abyssinia, according to Dalla Torre, *op. cit.*, 1904, p. 52); *O. mauritanicus* (Lepeletier) from Algeria (Mauritius, according to Dalla Torre, Cat., IX, Vesp., 1894, p. 77). *O. rhynchiformis* Saussure, which was described from the Cape Colony (H. de Saussure, Et. fam. Vesp., I, Eum., 1852, p. 174), is a synonym of *O. crenatus* Lepeletier, and inhabits the Mediterranean subregion (H. de Saussure, *ibid.*, III, Suppl., 1854, pp. 231 and 236). *O. limbatus* (Saussure) is reported from Madagascar by F. Smith (Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 48) and Dalla Torre; but the exact locality of this species is unknown; it is probably Asiatic (see H. de Saussure, Smithsonian Misc. Coll., XIV, No. 254, 1875, p. 143).

Vespa squamigera FABRICIUS, Syst. Piez., 1804, p. 267, from Guinea, may have been an *Odynerus*.

Subgenus 1. **Odynerus** LATREILLE, *sensu stricto*

Epipone KIRBY and SPENCE, Introd. to Entom., I, 1818, p. 349 (*nec Epipona* LATREILLE, 1802).

Oplopus WESMAEL, Bull. Ac. Sc. Belgique, III, 1836, p. 45 (*nec Hoplopus* LAPORTE, 1832).

Oplomerus WESTWOOD, Introd. to Mod. Class. of Ins., II, Synopsis, 1840, p. 84 (*nec Oplomerus* DEJEAN, 1833).

Hoplomerus C. G. THOMSON, Skandinaviens Hymenoptera, III, 1. *Vespa* L., 1874, pp. 35 and 41 (as a genus).

Type: *Vespa spinipes* Linné, 1758.

1. **Odynerus adonis** G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 498 and 519 (♀).

Belgian Congo (Katanga).—Type locality: "Lufira River, 3500 feet."

Probably a synonym of *Pterochilus versicolor* A. v. Schulthess.

2. **Odynerus alexandrinus** H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 225 (♀ ♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 70. ED. ANDRÉ, Spéc. Hym. Eur. Algér., II, fasc. 21-23, 1884, pp. 765 and 782 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 51; Gen. Ins. Vesp., 1904, p. 39.

Oplopus alexandrinus RADOSZKOWSKY, Hor. Soc. ent. Rossicæ, XII, 1876, p. 144. SAVIGNY, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. VIII, fig. 10 (♀).

Egypt.—Type locality: "l'Egypte."

3. **Odynerus eversmanni** (RADOSZKOWSKY) ED. ANDRÉ, Spéc. Hym. Eur.

Algér., II, fasc. 21-23, 1884, p. 783 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 66; Gen. Ins. Vesp., 1904, p. 44.

Oplopus eversmanni RADOSZKOWSKY, Hor. Soc. ent. Rossicæ, XII, 1876, p. 144 (♀).

SAVIGNY, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. ix, fig. 8 (♀).

Egypt.—Type locality: "Egypte."

4. *Odynerus ferruginosus* H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 299 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 68; Gen. Ins. Vesp., 1904, p. 45. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 489.

Cape Colony.—Type locality: "le Cap de Bonne-Espérance."

5. *Odynerus gestroi* (MAGRETTI).

Rygchium gestroi MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 614 (♀).

Rhynchium gestroi DALLA TORRE, Cat., IX, Vesp., 1894, p. 44; Gen. Ins. Vesp., 1904, p. 34.

Oriental Sudan.—Type locality: "Ain."

Perhaps the same as *O. spiniger* A. v. Schulthess var. *maculatus* A. v. Schulthess.

6. *Odynerus quartinæ* GRIBODO, Ann. Mus. civ. Genova, XXI, 1884, p. 290 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 92; Gen. Ins. Vesp., 1904, p. 52. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 489.

East Africa.—Type locality: "Let-Marefià."

7. *Odynerus savignyi* H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 226 (♀); III, Suppl., 1854, p. 307. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 70. DALLA TORRE, Cat., IX, Vesp., 1894, p. 95; Gen. Ins. Vesp., 1904, p. 54.

Arabia.—Type locality: "Djidda."

8. *Odynerus senegalensis* H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 219; Pl. XIX, fig. 7 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 73. DALLA TORRE, Cat., IX, Vesp., 1894, p. 96; Gen. Ins. Vesp., 1904, p. 54. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 489.

Senegal.—Type locality: "le Sénégal."

9. *Odynerus simplex* C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), X, 1902, p. 222 (♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 54. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 498.

Transvaal.—Type locality: "Pretoria."

10. *Odynerus spiniger* A. v. SCHULTHESS, Soc. entomol., XXIX, 1914, p. 73, fig. (♀ ♂). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 498 and 518.

Katanga, Somaliland, Kalahari, Bechuanaland, Damaraland, Cape Colony, Eritrea.—Type locality: "Willowmore."

10a. var. *maculatus* A. v. SCHULTHESS, Soc. entomol., XXIX, 1914, p. 74. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 498.

Type locality: not given.

Perhaps a synonym of *O. gestroi* (Magretti).

11. *Odynerus zebroides* G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 498 and 518 (♀ ♂).

British East Africa.—Type locality: "Ongotta, Nairowa."

Subgenus 2. **Rygchium** SPINOLA

Insecta Ligur., I, 1806, p. 84 (as a genus).

Rhynchium H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 170.

Odynerus subgenus *Leionotus* H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, pp. 121 and 151.

Leptochilus H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 233.

Type: *Vespa oculata* Fabricius, 1781 (= *Rygchium europæum* Spinola, 1807).

12. **Odynerus abdominalis** (ILLIGER).

Vespa abdominalis ILLIGER, Magaz. f. Insektenk., I, 1802, p. 192.

Rhynchium abdominale H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 172; in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 159 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 42; Gen. Ins. Vesp., 1904, p. 33. C. T. BINGHAM, Fauna Brit. India, Hym., I, 1897, p. 357 (♀ ♂).

Vespa transversa FABRICIUS, Syst. Piez., 1804, p. 257.

Rygchium transversum H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 117; Pl. xiv, fig. 7 (♀).

Rhynchium transversum F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 48. India, (Madagascar?).—Type locality: "aus Bengalen."

13. **Odynerus acanthoaspis** P. CAMERON, Rec. Albany Mus., I, 4, 1905, p. 204 (♂). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 487.

Cape Colony.—Type locality: "Brak Kloof."

14. **Odynerus æquinoxialis** H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 300 (♀).

Odynerus æquinotialis DALLA TORRE, Cat., IX, Vesp., 1894, p. 50; Gen. Ins. Vesp., 1904, p. 39. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 497.

Tropical Africa.—Type locality: "l'Afrique."

15. **Odynerus æstuans** (H. DE SAUSSURE).

Rhynchium æstuans H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 206 (♀). GRIBODO, Bull. Soc. ent. Italiana, XXIII, 1891, p. 285. DALLA TORRE, Cat., IX, Vesp., 1894, p. 43; Gen. Ins. Vesp., 1904, p. 33. A. v. SCHULTHESS, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 343; Deutsche entom. Zeitschr., 1914, p. 292.

Synagris æstuans var.? H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 155.

Senegal, Cameroon, Gaboon, Natal, Belgian Congo.—Type locality: "Sénégal."

16. **Odynerus æthiopicus** H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 287; Pl. XIII, fig. 8 (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 72. DALLA TORRE, Cat., IX, Vesp., 1894, p. 50; Gen. Ins. Vesp., 1904, p. 39. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 488 and 496.

Sierra Leone.—Type locality: "Sierra Leone."

17. **Odynerus alboniger** J. BEQUAERT. See p. 172 (♀).

Belgian Congo.—Type locality: Thysville.

18. **Odynerus anceps** (GRIBODO).

Rygchium anceps GRIBODO, Bull. Soc. ent. Italiana, XXIII, 1891, p. 280 (♀).

Rhynchium anceps DALLA TORRE, Cat., IX, Vesp., 1894, p. 43; Gen. Ins. Vesp., 1904, p. 33. E. ROUBAUD, C. R. Ac. Sc. Paris, CLIII, 1911, pp. 476-480 (ethology); Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 16-30 (ethology).

West Africa: Upper Senegal, Dahomey, Niger, Benue, Belgian Congo.— Type locality: "Benue."

19. **Odynerus andreanus** H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 161 and 167; Pl. XIX, figs. 4, 4b, and 4c (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 52; Gen. Ins. Vesp., 1904, p. 40. R. DU BUYSSON, Ann. Soc. ent. France, LXIX, 1900, p. 178, figs. 10 and 11 (♂).

Madagascar, Nossi Bé.— Type locality: "Nosibé."

20. **Odynerus angolensis** RADOSZKOWSKY, Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 204 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 52; Gen. Ins. Vesp., 1904, p. 40.

Angola, Belgian Congo.— Type locality: "Angola."

21. **Odynerus angustus** H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 228 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 52; Gen. Ins. Vesp., 1904, p. 40. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 488.

Abyssinia.— Type locality: "Abyssinie."

22. **Odynerus ardens** GUÉRIN, in Lefebvre, Voy. Abyssinie, IV, Zool., pt. VI, 1848, p. 362; Atlas, Pl. VIII, fig. 9.

Rygiium ardens H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 104 (♂).

Rhynchium ardens F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 47. DALLA TORRE, Cat., IX, Vesp., 1894, p. 43; Gen. Ins. Vesp., 1904, p. 33.

Rygiium abyssinicum H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 103 (♀).

Rhynchium abyssinicum F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 47. H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 208 (♀); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 175 (♀ ♂).

Abyssinia.— Type locality: "Abyssinie."

23. **Odynerus arethusæ** G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 493 and 507 (♂).

Nyasaland.— Type locality: "Mlanje, 2300 ft."

24. **Odynerus armatiscutis** P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 190 (♀). G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 52; Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 487 and 493. A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 15.

East Africa.— Type locality: "Kilimandjaro, lower Kibonoto."

25. **Odynerus auratus** (FABRICIUS) W. A. SCHULZ, Berliner ent. Zeitschr., LVII, 1912, p. 82 (♀).

Vespa aurata FABRICIUS, Mant. Insect., I, 1787, p. 289. OLIVIER, Encycl. méthod. Insect., VI, 1791, p. 683. DALLA TORRE, Cat., IX, Vesp., 1894, p. 138; Gen. Ins. Vesp., 1904, p. 66.

Sierra Leone.— Type locality: "in Sierra Leon Africæ."

26. **Odynerus aureosericeus** G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 496 and 514 (♀).

Uganda.— Type locality: "W. of Victoria Nyanza, Buddu, 3700 ft."

27. **Odynerus auro-maculatus** (H. DE SAUSSURE).

Rygiium auro-maculatum H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 104; Pl. XIV, fig. 1 (♀ ♂).

Rhynchium auro-maculatum F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 47. DALLA TORRE, Cat., IX, Vesp., 1894, p. 43; Gen. Ins. Vesp., 1904, p. 33.

Rhynchium aureo-maculatum E. ROUBAUD, Ann. Sc. nat., Zool., (10), I, 1, 1916, pp. 31-32 (ethology).

Rhynchium bioculatum H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 183 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 46. DALLA TORRE, Cat., IX, Vesp., 1894, p. 43.

Senegal, Dahomey, Upper Niger.—This species was recorded from Java by H. de Saussure, probably by mistake.—Type locality: "Sénégal."

28. *Odynerus bairstowi* GRIBODO, Bull. Soc. ent. Italiana, XXIII, 1891, p. 292 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 55; Gen. Ins. Vesp., 1904, p. 40. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 498.

West Africa.—Type locality: "Benue."

29. *Odynerus bellatulus* H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 210; Pl. xviii, fig. 10; III, Suppl., 1854, p. 243 (♀). RADOSZKOWSKY, Journ. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 205. DALLA TORRE, Cat., IX, Vesp., 1894, p. 55; Gen. Ins. Vesp., 1904, p. 41. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 497. E. ROUBAUD, Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 35-36 (ethology).

SAVIGNY, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. ix, fig. 14 (♂).

Odynerus bellatulus F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 72. WALKER, List Hym. Egypt, 1871, p. 32.

Senegal, Egypt, Obock, Zanzibar Island, Angola.—Type locality: "le Sénégal."

30. *Odynerus bisellatus* A. v. SCHULTHESS, Soc. entomol., XXIX, 1914, pp. 63 and 65 (♀♂). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 491; Pl. xci, fig. 2 (♂).

Delagoa Bay.—Type locality: "Rikatla."

31. *Odynerus bothriogaster* A. SCHLETTERER, Ann. Soc. ent. Belgique, XXXV, 1891, p. 27; Pl. i, fig. 6 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 57; Gen. Ins. Vesp., 1904, p. 41. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 496.

Belgian Congo.—Type locality: "Equateur-Congo."

Probably a color variety of *O. carinulatus* Saussure.

32. *Odynerus cameroni* W. A. SCHULZ, Spolia Hymenopterologica, 1906, p. 220. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 487 and 491.

Odynerus tegularis P. CAMERON, Rec. Albany Mus., I, 4, 1905, p. 206 (♂). (nec MORAWITZ, 1885; nec P. CAMERON, 1910).

Cape Colony.—Type locality: "Teafontein."

33. *Odynerus canaliculatus* H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 260; Pl. xiv, fig. 4 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 70. DALLA TORRE, Cat., IX, Vesp., 1894, p. 58; Gen. Ins. Vesp., 1904, p. 41. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 486 and 491. A. v. SCHULTHESS, Soc. entomol., XXIX, 1914, p. 63.

Arabia.—Type locality: "l'Arabie."

34. *Odynerus capicola* G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 495 and 512 (♀♂).

Cape Colony.—Type locality: "Willowmore."

35. *Odynerus carinulatus* H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 259; Pl. xiv, figs. 3 and 3a (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 74. MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 618 (♂). DALLA TORRE,

Cat., IX, Vesp., 1894, p. 59; Gen. Ins. Vesp., 1904, p. 42. C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), X, 1902, p. 221. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 494.

Rhynchium stironotum P. CAMERON, Ann. Transvaal Mus., II, 3, 1910, p. 161 (♀ ♂).

Abyssinia, Belgian Congo, East Africa, Mozambique, Transvaal.—Type locality: "l'Afrique."

36. *Odynerus caviventris* KIRSCH, Mitt. Zool. Mus. Dresden, III, 1878, p. 380 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 59; Gen. Ins. Vesp., 1904, p. 42. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 488. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 33.

Lake Nyasa.—Type locality: "Nyassa."

37. *Odynerus chapini* J. BEQUAERT. See p. 188 (♀ ♂).

Belgian Congo.—Type locality: Stanleyville.

38. *Odynerus chloroticus* SPINOLA, Ann. Soc. ent. France, VII, 1838, p. 500 (♀); XI, 1842, Bull., p. xxxvii. H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 239. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 70. L. v. HEYDEN, Berliner ent. Zeitschr., XI, 1867, p. 398. MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 616 (♀ ♂). ED. ANDRÉ, Spéc. Hym. Eur. Algér., II, fasc. 21-23, 1884, p. 687 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 60; Gen. Ins. Vesp., 1904, p. 42. C. T. BINGHAM, Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 110.

Rhynchium chloroticum F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 253, Pl. VIII, fig. 8 (♂).

SAVIGNY, Descr. Egypte, Atlas, Zool., Ins., Hym., 1812, Pl. IX, fig. 1 (♀).

Odynerus testaceus H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 195 (♀).

Egypt, Eastern Sudan, Southern Arabia.—Type locality: "Egypte."

39. *Odynerus chrysomallus* (A. SCHLETTERER).

Rhynchium chrysomallum A. SCHLETTERER, Ann. Soc. ent. Belgique, XXXV, 1891, p. 23; Pl. I, fig. 9 (♀). F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 343. DALLA TORRE, Cat., IX, Vesp., 1894, p. 43; Gen. Ins. Vesp., 1904, p. 33.

Gaboon, Belgian Congo.—Type locality: "Equateur-Congo."

40. *Odynerus cnemophilus* P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 191 (♀). G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 52; Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 495. A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 17.

East Africa.—Type locality: "Kilimandjaro, Kibonoto, 1300-1900 m."

41. *Odynerus combustus* F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 73 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 61; Gen. Ins. Vesp., 1904, p. 42. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 496.

Gambia.—Type locality: "the Gambia."

42. *Odynerus congolensis* J. BEQUAERT. See p. 176 (♀ ♂).

Belgian Congo.—Type locality: Boma.

43. *Odynerus conradsii* A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, pp. 17 and 20 (♀ ♂); Soc. entomol., XXIX, 1914, p. 63. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 491.

German East Africa.—Type locality: "Marienhof, Ukerewe."

44. *Odynerus corvus* G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 498 and 517; Pl. xci, fig. 15 (♀ ♂).

British East Africa, Nyasaland, South East Rhodesia.—Type locality: "Mlanje."

45. **Odynerus cyanopterus** (H. DE SAUSSURE).

Ryngchium cyanopterus H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 108 (♀ ♂).

Rhynchium cyanopterus F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 47. H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 159 (♀ ♂). WALKER, List Hym. Egypt, 1871, p. 31. ED. ANDRÉ, Spéc. Hym. Eur. Algér., II, fasc. 21–23, 1884, p. 649 (♀ ♂). MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 613; (2), XIX, 1898, p. 594. DALLA TORRE, Cat., IX, Vesp., 1894, p. 43; Gen. Ins. Vesp., 1904, p. 33. F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 249. C. T. BINGHAM, Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 109; Ann. Mag. Nat. Hist., (7), X, 1902, p. 221; (7), XII, 1903, p. 67. R. DU BUYSSON, Bull. Soc. ent. France, 1908, p. 135.

SAVIGNY, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. IX, fig. 9 (♂).

Senegal, Central Sahara, Egypt, Oriental Sudan, Abyssinia, Nyasaland, Southern Arabia, Madagascar.— Type locality: "Sénégal."

45a. var. **congicus** J. BEQUAERT. See p. 146 (♀).

Belgian Congo.— Type locality: Avakubi.

45b. var. **sabulosus** (H. DE SAUSSURE).

Rhynchium sabulosum H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 179. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 47. DALLA TORRE, Cat., IX, Vesp., 1894, p. 48; Gen. Ins. Vesp., 1904, p. 35.

Rhynchium cyanopterus var. *mossambicum* GRIBODO, Mem. Ac. Sc. Bologna, (5), V, 2, 1895, Sc. nat., p. 98 (♀ ♂).

Rhynchium transvaalense P. CAMERON, Ann. Transvaal Mus., II, 3, 1910, pp. 162 and 163 (♀).

Senegal, Mozambique, Transvaal.— Type locality: "Sénégal."

46. **Odynerus dantici** (ROSSI) SPINOLA, Insecta Ligur., I, 1806, p. 88. H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 192 (♀ ♂); III, Suppl., 1854, p. 235 (♀ ♂). ED. ANDRÉ, Spéc. Hym. Eur. Algér., II, fasc. 21–23, 1884, p. 700; Pl. xxxvi, figs. 13 and 19 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 63; Gen. Ins. Vesp., 1904, p. 43.

Vespa dantici ROSSI, Fauna etrusca, II, 1790, p. 89; Pl. vi, fig. 6.

Odynerus fastidiosus H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 189 (♀). C. T. BINGHAM, Journ. Bombay Nat. Hist. Soc., XII, pt. 1, 1898, p. 110.

Southern Europe, Northern Africa, Egypt, Asia Minor, Southern Arabia.— Type locality: Italy.

47. **Odynerus dauensis** MAGRETTI, Ann. Mus. civ. Genova, (2), XIX, 1898, p. 34 (♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 43. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 489.

Somaliland.— Type locality: "lungo il Daua."

48. **Odynerus defractus** R. DU BUYSSON, Rev. d'Ent. Caen, XXV, 1906, p. 108 (♂). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3–4, 1915, p. 493.

Odynerus parvulus var. H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 225 (♂).

Odynerus parvulus P. MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 617. WALKER, List Hym. Egypt, 1871, p. 32 (*nec* LEPELETIER, 1841).

East Africa, Abyssinia, Eastern Sudan.— Type locality: "Nairobi."

The true *O. parvulus* Lepeletier, Hist. nat. Ins. Hym., II, 1841, p. 631, is a Mediterranean species, which apparently does not occur in the Ethiopian region.

49. **Odynerus denticulatus** (A. Mocsáry):
Synagris denticulata A. Mocsáry, Ann. Mus. nat. Hungarici, I, 1903, p. 506 (♀).
Rhynchium denticulatum F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 310.
 German East Africa.—Type locality: "Ukani."
 50. **Odynerus desperatus** J. BEQUAERT. See p. 166 (♀ ♂).
 Belgian Congo.—Type locality: Stanleyville.
 51. **Odynerus determinatus** P. CAMERON, Ann. Transvaal Mus., II, 3, 1910, p. 163 (♂). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 488.
 Transvaal.—Type locality: "Waterval."
 52. **Odynerus dimidiatus** SPINOLA, Ann. Soc. ent. France, VII, 1838, p. 502 (♀ ♂). H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 260. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 70. ED ANDRÉ, Spéc. Hym. Eur. Algér., II, fasc. 24-26, 1886, p. 867 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 65; Gen. Ins. Vesp., 1904, p. 44. W. A. SCHULZ, Spolia Hymenopterologica, 1906, p. 219.
Rhynchium dimidiatum H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 182. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 46. DALLA TORRE, Cat., IX, Vesp., 1894, p. 44; Gen. Ins. Vesp., 1904, p. 33.
 Egypt, Malta Island.—Type locality: "Egypte."
 53. **Odynerus dimorphus** G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 492 and 507 (♀ ♂).
 Orange Free State, German Southwest Africa.—Type locality: "Bothaville."
 54. **Odynerus dunbrodyensis** P. CAMERON, Rec. Albany Mus., I, 4, 1905, p. 264 (♀). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 487.
Odynerus carinatus G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 491 and 502; Pl. xci, fig. 7 (♀ ♂).
 Cape Colony.—Type locality: "Dunbrody."
 55. **Odynerus emeryanus** GRIBODO, Bull. Soc. ent. Italiana, XXIII, 1891, p. 293 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 66; Gen. Ins. Vesp., 1904, p. 44. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 489.
Odynerus benitensis A. V. SCHULTHESS, Soc. entomol., XXVIII, 1913, p. 6 (♀ ♂); Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 348, figs. 10-12 (♀ ♂).
 Sierra Leone, Spanish Guinea, Belgian Congo.—Type locality: "Sierra Leone."
 56. **Odynerus erythrinus** (H. DE SAUSSURE).
Rhynchium erythrimum H. DE SAUSSURE, Reise d. Novara, Zool., II, 1, Hymen., 1867, p. 7 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 44; Gen. Ins. Vesp., 1904, p. 33.
 Cape Colony.—Type locality: "Promontorium Bonæ Spei."
 57. **Odynerus erythrotomus** P. CAMERON, Rec. Albany Mus., I, 5, 1905, p. 325 (♂). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 488 and 497.
 Cape Colony.—Type locality: "Dunbrody."
 58. **Odynerus euryaspilus** P. CAMERON, Ann. Transvaal Mus., II, 3, 1910, p. 166 (♀). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 494 and 510 (♀ ♂).
Odynerus broomi P. CAMERON MS. (teste G. Meade Waldo).
 Transvaal, Cape Colony.—Type locality: "Transvaal."

59. **Odynerus exiguus** H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 321 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 67; Gen. Ins. Vesp., 1904, p. 45.

Leptochilus exiguus H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 237 (♀ ♂). SAVIGNY, Descr. Egypte, Atlas, Zool., Ins. Hymén., 1812, Pl. viii, fig. 11 (♀ ♂). Egypt.—Type locality: ?

60. **Odynerus falcatus** A. TULLGREN, Ark. f. Zool., I, 1904, p. 452; Pl. xxv, figs. 13 a-b (♀). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 488 and 497.

Odynerus 14-maculatus A. v. SCHULTHESS, Wiss. Ergebn. D. Z. Afrik. Exp. (1907-08), IV, Zool., 2, Heft 10, 1912, p. 294, figs. 4-6 (♀ ♂); Soc. entomol., XXVIII, 1913, p. 6 (♀ ♂); Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 347, figs. 7-9 (♀ ♂). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 497.

Belgian Congo, Cameroon.—Type locality: "Cameroon."

61. **Odynerus fallax** (H. DE SAUSSURE).

Rhynchium fallax H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 175 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 46. RADOSZKOWSKY, Journ. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 205. DALLA TORRE, Cat., IX, Vesp., 1894, p. 44; Gen. Ins. Vesp., 1904, p. 33. C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), X, 1902, p. 221. P. CAMERON, Ann. Transvaal Mus., II, 3, 1910, p. 162.

West Africa, Angola, Nyasaland, Transvaal.—Type locality: "Afrique occidentale."

62. **Odynerus farquharensis** P. CAMERON, Trans. Linn. Soc. London, (2), XII, Zool., pt. 1, 1907, p. 74 (♀ ♂). G. MEADE WALDO, Trans. Linn. Soc. London, (2), XV, Zool., pt. 1, 1912, p. 43.

Farquhar Island, Aldabra Island.—Type locality: "Farquhar Atoll."

63. **Odynerus fastidiosissimus** H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 265; Pl. xii, fig. 7 (♀ ♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 224 (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 68. ED. ANDRÉ, Spéc. Hym. Eur. Algér., II, fasc. 21-23, 1884, p. 740 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 67; Gen. Ins. Vesp., 1904, p. 45.

Southern Europe, North Africa, Egypt.—Type locality: unknown.

64. **Odynerus ferruginatus** J. BEQUAERT.

Stenodynerus ferrugineus A. v. SCHULTHESS, Soc. entomol., XXIX, 1914, p. 72, fig. (♀ ♂).

Odynerus ferrugineus G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 498; Pl. xci, fig. 13.

Delagoa Bay, North Transvaal, East Africa.—Type locality: "Rikatla."

65. **Odynerus ferrugineus** (RADOSZKOWSKY).

Rhynchium ferrugineum RADOSZKOWSKY, Journ. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 205 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 44; Gen. Ins. Vesp., 1904, p. 33.

Angola.—Type locality: "Angola."

66. **Odynerus fervens** (WALKER).

Rhynchium fervens WALKER, List Hym. Egypt, 1871, p. 31 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 44; Gen. Ins. Vesp., 1904, p. 33.

Arabia.—Type locality: "Mount Sinai."

67. **Odynerus ferrvidus** H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 288. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 74. DALLA TORRE, Cat., IX, Vesp., 1894, p. 68; Gen. Ins. Vesp., 1904, p. 45. C. T. BINGHAM, Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 110. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 487 and 494; Pl. xci, fig. 10 (♂).

Africa, Southern Arabia.—Type locality: "l'Afrique."

68. **Odynerus foraminosus** (GRIBODO).

Rhynchium foraminosum GRIBODO, Mem. Ac. Sc. Bologna, (5), V, 2, 1895, Sc. nat., p. 101 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 34.

Mozambique.—Type locality: "Lourenço-Marques."

69. **Odynerus forticulus** (F. KOHL).

Rhynchium forticulum F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 250; Pl. v, figs. 15, 23, 28, and 30 (♀ ♂).

Southern Arabia, Egypt.—Type locality: "Südarabien (Makalla)."

70. **Odynerus frendens** GRIBODO, Bull. Soc. ent. Italiana, XXIII, 1891, p. 294 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 69; Gen. Ins. Vesp., 1904, p. 45. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 489.

Cape Colony.—Type locality: "Port Elizabeth."

71. **Odynerus gambiensis** G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 492 and 504 (♀).

Gambia.—Type locality: "Gambia."

72. **Odynerus goniodes** A. SCHLETTERER, Ann. Soc. ent. Belgique, XXXV, 1891, p. 25; Pl. I, fig. 4 (♀ ♂). F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 343. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 493; Pl. xci, fig. 5.

Odynerus gonioides DALLA TORRE, Cat., IX, Vesp., 1894, p. 70; Gen. Ins. Vesp., 1904, p. 46.

Belgian Congo, Cameroon.—Type locality: "Equateur-Congo."

73. **Odynerus grandidieri** H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 161 and 164; Pl. iv, fig. 16 (♀); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 237 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 71; Gen. Ins. Vesp., 1904, p. 46.

Madagascar.—Type locality: "Madagascar."

74. **Odynerus grayi** (H. DE SAUSSURE).

Rhynchium grayi H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 175 (♀). GRIBODO, Bull. Soc. ent. Italiana, XXIII, 1891, p. 285. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 47; Pl. III, fig. 1. DALLA TORRE, Cat., IX, Vesp., 1894, p. 44; Gen. Ins. Vesp., 1904, p. 34.

Cape Colony, Natal, East Africa.—Type locality: "Port Natal."

74a. var. **neavei** (G. MEADE WALDO).

Rhynchium grayi var. *neavei* G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 456 (♂).

Nyasaland.—Type locality: "Karonga."

74b. var. **sumptuosus** (GRIBODO).

Rhynchium grayi var. *sumptuosum* GRIBODO, Mem. Ac. Sc. Bologna, (5), V, 2, 1895, Sc. nat., p. 95 (♀).

Mozambique.—Type locality: "Lourenço Marques."

74c. var. **thomsoni** (P. CAMERON).

Rhynchium thomsoni P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimand-

jaro, II, 8, 6, 1910, p. 183 (♀) [See G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 51].

East Africa.—Type locality: "Kilimandjaro: Kibonoto."

74d. var. **usambaraensis** (P. CAMERON).

Rhynchium usambaraense P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 183 (♀ ♂). G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 51. A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 14.

Rhynchium grayi var. *usambaraense* A. v. SCHULTHESS, Soc. entomol., XXIX, 1914, p. 57.

East Africa.—Type locality: "Usambara: Mombo."

75. **Odynerus guerini** H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 176 (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 74. DALLA TORRE, Cat., IX, Vesp., 1894, p. 71; Gen. Ins. Vesp., 1904, p. 46. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 488. GRIBODO, Mem. Ac. Sc. Bologna, (5), V, 2, 1895, Sc. nat., p. 102.

Odynerus æstuans H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 222; Pl. II, fig. 25 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 50; Gen. Ins. Vesp., 1904, p. 39.

Abyssinia, Mozambique.—Type locality: "l'Afrique."

76. **Odynerus guineensis** H. DE SAUSSURE, Rev. Mag. de Zool., (2), X, 1858, p. 167. DALLA TORRE, Cat., IX, Vesp., 1894, p. 71; Gen. Ins. Vesp., 1904, p. 46.

Guinea.—Type locality: "l'Afrique tropicale."

77. **Odynerus guineensis** H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 227 (♀). (*nec O. guineensis* SAUSSURE, 1858).

Guinea.—Type locality: "Côte de Guinée."

This wasp is entirely different from the *Odynerus guineensis* described by H. de Saussure in 1858, as can be seen easily in comparing the descriptions. This species has probably been redescribed under some other name, so it does not seem advisable to rename it here.

78. **Odynerus hæmorrhoidalis** (FABRICIUS).

Vespa hæmorrhoidalis FABRICIUS, Syst. Entom., 1775, p. 366. OLIVIER, Encycl. méthod. Ins., VI, 1791, p. 683.

Rygchium hæmorrhoidale H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 109 (♀ ♂).

Rhynchium hæmorrhoidale DALLA TORRE, Cat., IX, Vesp., 1894, p. 44; Gen. Ins. Vesp., 1904, p. 34.

This variable wasp is common throughout the Oriental Region, from Persia to New Guinea, Australia, and Formosa. Originally described by Fabricius from the Cape Colony, where its occurrence is very doubtful.—Type locality: "ad Cap. b. Spei."

78a. var. **quinquecinctus** (FABRICIUS).

Vespa quinquecincta FABRICIUS, Mant. Insect., I, 1787, p. 288. OLIVIER, Encycl. méthod. Ins., VI, 1791, p. 683.

Vespa brunnea FABRICIUS, Ent. Syst., II, 1793, p. 264.

Rygchium brunneum H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 112; Pl. XIV, figs. 4 and 4a-d (♀ ♂).

Rhynchium brunneum F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 44. C. T. BINGHAM, Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 110; Fauna of Brit. India, Hym., I, 1897, p. 355, fig. 103 (♀ ♂).

Rhynchium hæmorrhoidale var. *brunneum* H. DE SAUSSURE, Entom. Zeitg. Stettin, XXIII, 1862, p. 190.

Rhynchium hæmorrhoidale var. *quinquecinctum* DALLA TORRE, Cat., IX, Vesp., 1894, p. 45; Gen. Ins. Vesp., 1904, p. 34.

Throughout the Oriental Region and apparently the most common color variation of the species; extends westward to Southern Arabia (Aden).—Type locality: "China."

79. **Odynerus hansii** G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 491 and 503 (♂).

Orange Free State.—Type locality: "Bothaville."

80. **Odynerus harrarensis** G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 497 and 516 (♀ ♂).

Abyssinia, East Africa.—Type locality: "Harrar."

81. **Odynerus hildebrandti** H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 161 and 166; Pl. xvii, fig. 10 (♀ ♂); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 237. DALLA TORRE, Cat., IX, Vesp., 1894, p. 72; Gen. Ins. Vesp., 1904, p. 46.

Madagascar.—Type locality: "partie centrale de Madagascar."

82. **Odynerus histrionicus** (GERSTÆCKER).

Rhynchium histrionicum GERSTÆCKER, Monatsb. k. Preuss. Ak. Wiss. Berlin, 1857, p. 463 (♀); in Peters, Reise n. Mossambique, Zool., V, 1862, p. 465; Pl. xxx, fig. 4 (♀). RADOSZKOWSKY, Journ. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 205. DALLA TORRE, Cat., IX, Vesp., 1894, p. 46; Gen. Ins. Vesp., 1904, p. 34. A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 274.

Rhynchium emeryanum GRIBODO, Mem. Ac. Sc. Bologna, (5), V, 2, 1895, Sc. nat., p. 99 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 33.

Mozambique, Angola.—Type locality: "Mossambique."

83. **Odynerus histrionimimus** J. BEQUAERT. See p. 190 (♀ ♂).

Belgian Congo.—Type locality: Banana.

84. **Odynerus holomelas** (ERN. ANDRÉ).

Rhynchium holomelas ERN. ANDRÉ, Rev. d' Ent. Caen, XIV, 1895, p. 355 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 34. A. v. SCHULTHESS, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 344; Deutsche entom. Zeitschr., 1914, p. 292.

Cameroon, Gaboon.—Type locality: "Ogooué."

85. **Odynerus holosericeus** (RADOSZKOWSKY).

Rhynchium holosericeum RADOSZKOWSKY, Journ. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 206 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 46; Gen. Ins. Vesp., 1904, p. 34.

Angola.—Type locality: "Angola."

Probably a synonym of *O. cyanopterus* (Saussure).

86. **Odynerus hottentotus** H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 244 (♀ ♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 71. DALLA TORRE, Cat., IX, Vesp., 1894, p. 72; Gen. Ins. Vesp., 1904, p. 47. R. DU BUYSSON, Ann. Soc. ent. France, LXVI, fasc. 2-3, 1898, p. 361. C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), XII, 1903, p. 68. G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), VI, 1910, p. 101; Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 495 and 511; Pl. xci, fig. 8.

Odynerus posticus H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 214 (♂). (nec HERRICH SCHÄFFER, 1841).

Odynerus erythropsilus P. CAMERON, Rec. Albany Mus., I, 4, 1905, p. 205 (♀).

Cape Colony, Transvaal, Mashonaland.—Type locality: "le Cap de Bonne-Espérance."

87. *Odynerus hova* H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt a.M., XXVI, 2, 1900, p. 238 (♀ ♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 47.

Nossi Bé.—Type locality: "Nossi-Bé."

88. *Odynerus hyacinthæ* GRIBODO, Bull. Soc. ent. Italiana, XXIII, 1891, p. 290 (♂ ♀).

Odynerus hyacinthæ GRIBODO, *op. cit.*, p. 291. DALLA TORRE, Cat., IX, Vesp., 1894, p. 73; Gen. Ins. Vesp., 1904, p. 47. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 488.

Sierra Leone, Gaboon, Belgian Congo.—Type locality: "Gaboon."

89. *Odynerus ignaruris* F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 256; Pl. II, fig. 18; Pl. VIII, figs. 1, 11, 17, and 21 (♀).

Southern Arabia.—Type locality: "Ras Fartāk."

90. *Odynerus incensus* (GRIBODO).

Rhynchium incensum GRIBODO, Mem. Ac. Sc. Bologna, (5), V, 2, 1895, Sc. nat., p. 95 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 34.

Mozambique.—Type locality: "Pinetown."

91. *Odynerus indecorus* P. CAMERON, Ann. Transvaal Mus., II, 3, 1910, p. 166 (♀). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 488 and 497.

Cape Colony.—Type locality: "Dunbrody."

92. *Odynerus inermis* (A. MOCŠÁRY).

Synagris inermis A. MOCŠÁRY, Ann. Mus. nat. Hungarici, I, 1903, p. 504 (♀ ♂).

Rhynchium inerme F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 316.

German East Africa.—Type locality: "Ukami."

92a. var. *atratus* (A. MOCŠÁRY).

Synagris inermis var. *atrata* A. MOCŠÁRY, Ann. Mus. nat. Hungarici, I, 1903, p. 505 (♀).

Rhynchium inerme var. *atratum* F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 316.

East Africa.—Type locality: "Kilimandsaro."

93. *Odynerus jocosus* A. GERSTÆCKER, Arch. f. Naturg., XXXVIII, 1, 1871, p. 351 (♂); in v. d. Decken's Reisen in Ost-Afrika, III, 2, Gliederth., 1873, p. 323 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 74; Gen. Ins. Vesp., 1904, p. 47. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 33. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 493.

British East Africa.—Type locality: "Mombas."

94. *Odynerus junodi* (GRIBODO).

Rhynchium junodi GRIBODO, Mem. Ac. Sc. Bologna, (5), V, 2, 1895, Sc. Nat., p. 97 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 34.

Mozambique.—Type locality: "Lourenço-Marques."

Apparently the same as *O. lacuum* (Stadellmann).

95. *Odynerus junodianus* (A. v. SCHULTHESS).

Rhynchium junodianum A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 273 (♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 34.

Mozambique.—Type locality: "Delagoa."

96. **Odynerus kabarensis** J. BEQUAERT. See p. 186 (♀ ♂).
Belgian Congo.— Type locality: Kabare.
97. **Odynerus karibæ** G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 493 and 508 (♀ ♂).
North Rhodesia, Nyasaland, Southeastern Belgian Congo (Katanga).— Type locality: "N. Rhodesia: Kariba Gorge."
98. **Odynerus katonai** A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, pp. 17 and 18 (♀); Soc. entom., XXIX, 1914, p. 62. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 491.
British and German East Africa.— Type locality: "Shirati."
99. **Odynerus kelidopterus** (F. KOHL).
Rhynchium kelidopterum F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 252; Pl. II, fig. 19; Pl. VIII, figs. 3, 9, 10, and 22 (♂).
Southern Arabia.— Type locality: "Aden."
100. **Odynerus kilimandjaroensis** P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 189 (♀). G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 53; Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 495. A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 18.
East Africa.— Type locality: "Meru low lands, Ngare na nyuki."
101. **Odynerus kloofensis** P. CAMERON, Rec. Albany Mus., I, 4, 1905, p. 204 (♂). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 488.
Cape Colony.— Type locality: "Brak Kloof."
102. **Odynerus kristenseni** G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 491 and 504 (♀).
Abyssinia.— Type locality: "Harrar."
103. **Odynerus lacuum** (STADELMANN).
Rhynchium lacuum STADELMANN, Deutsch Ost-Afrika, IV, Hym., 1898, p. 33 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 34.
Tanganyika (German East Africa).— Type locality: "Tanganyika-See."
Probably a synonym of *O. junodi* (Gribodo).
104. **Odynerus lateralis** (FABRICIUS), G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 495, 510, and 512 (♀ ♂).
Vespa lateralis FABRICIUS, Spec. Insect., I, 1781, p. 466 (♀); Mantis. Ins., I, 1787, p. 292.
Rhynchium furax F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 339; Pl. xv, fig. 89 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 44; Gen. Ins. Vesp., 1904, p. 34.
Odynerus truncatus H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 175 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 103; Gen. Ins. Vesp., 1904, p. 56.
Senegal, Gaboon, Belgian Congo, German East Africa (Bukoba).— Type locality: "ad Cap. B. S."
- 104a. var. **lateropictus** J. BEQUAERT. See p. 181 (♀ ♂).
Belgian Congo.— Type locality: Boma.
- 104b. var. **unicolor** (A. v. SCHULTHESS) G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 495.
Odynerus truncatus var. *unicolor* A. v. SCHULTHESS, Soc. entomol., XXIX, 1914, p. 57.
Lake Nyasa, Usumbara, Damaraland, Portuguese East Africa.— Type locality: "Ukerewe am Nyassasee."

105. **Odynerus luctuosus** (GERSTÄCKER).

Rhynchium luctuosum GERSTÄCKER, Monatsb. k. Preuss. Ak. Wiss. Berlin, 1857, p. 463 (♀ ♂); in Peters, Reise n. Mossambique, Zool., V, 1862, p. 467, Pl. xxx, fig. 6 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 46; Gen. Ins. Vesp., 1904, p. 34. F. KOHL, Jahrb. Hamburg. wiss. Anst., X, 2, (1892), 1893, p. 189. MAGRETTI, Ann. Mus. civ. Genova, (2), XIX, 1898, p. 33. A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 274. E. ZAVATTARI, Boll. Mus. Zool. Anat. comp. Torino, XXII, No. 550, 1907, p. 2.

Mozambique, Somaliland.—Type locality: "Tette."

106. **Odynerus lugubris** G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 495 and 513 (♀ ♂).

Nyasaland.—Type locality: "Mlanje, 2300 ft."

107. **Odynerus macrocephalus** GRIBODO, Mem. Ac. Sc. Bologna, (5), IV, 1894, Sc. natur., p. 60 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 48. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 488 and 497.

Mozambique.—Type locality: "fiume Magnarra."

108. **Odynerus madecassis** (H. DE SAUSSURE).

Rygygium madecasse H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 111 (♀).

Rhynchium madecassum H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 160; Pl. iv, figs. 11 and 11t (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 46; Gen. Ins. Vesp., 1904, p. 34. A. v. SCHULTHESS, Reise Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 72.

Rhynchium madegasse F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 48.

Madagascar, Nossi Bé.—Type locality: "Madagascar."

109. **Odynerus magretti** GRIBODO, Ann. Mus. civ. Genova, XXI, 1884, p. 290, in footnote (♀ ♂). MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 619. DALLA TORRE, Cat., IX, Vesp., 1894, p. 77; Gen. Ins. Vesp., 1904, p. 48. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 489. W. A. SCHULZ, Zool. Ann. Würzburg, IV, 1911, p. 199.

Abyssinia.—Type locality: "Abissinia."

110. **Odynerus malagassus** H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 237 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 48.

Nossi Bé.—Type locality: "Nossi-Bé."

111. **Odynerus marginellus** (FABRICIUS).

Vespa marginella FABRICIUS, Ent. System., II, 1793, p. 263; Syst. Piez., 1804, p. 259.

Rhynchium marginellum R. DU BUYSSON, Actes Soc. Linn. Bordeaux, LXIV, 1910, p. 228. E. ROUBAUD, Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 32-35 (ethology).

Vespa africana FABRICIUS, Syst. Piez., 1804, p. 257.

Rygygium africanum GUÉRIN, in Lefebvre, Voy. Abyssinie, IV, Zool., pt. VI, 1848, p. 363. H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 108; Pl. xiv, figs. 3 and 3a (♀).

Rhynchium africanum A. SCHLETTERER, Ann. Soc. ent. Belgique, XXXV, 1891, p. 24; Pl. I, fig. 7 (♀). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 513.

Rhynchium laterale H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 171. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 46. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 344. DALLA TORRE, Cat., IX, Vesp., 1894, p. 46; Gen.

Ins. Vesp., 1904, p. 34. Fox, Proc. Ac. Nat. Sc. Philadelphia, XLVIII, 1896, p. 555. C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), XII, 1903, p. 68. A. v. SCHULTHESS, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 344. WALKER, List Hym. Egypt, 1871, p. 31. A. TULLGREN, Ark. f. Zool., I, 1904, p. 451. P. CAMERON, Ann. Transvaal Mus., II, 3, 1910, p. 163.

Rygchium laterale GRIBODO, Ann. Mus. civ. Genova, XXI, 1884, p. 291. MARGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 614 (♂).

Mauritania, Senegal, Cameroon, Gaboon, Belgian Congo, Somaliland, Transvaal.—Type locality: "in Africa æquinoctiali."

112. *Odynerus marginipunctatus* G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 496 and 513; Pl. xci, fig. 6 (♀).

Nyasaland.—Type locality: "Mlanje, 2300 ft."

113. *Odynerus marginiscutis* (P. CAMERON).

Rhynchium marginiscutis P. CAMERON, Ann. Transvaal Mus., II, 3, 1910, p. 162 (♀).

Transvaal.—Type locality: "Warmberg."

114. *Odynerus meade-waldoi* J. BEQUAERT.

Odynerus deceptor G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 495 and 511 (♀). (*nec O. deceptor* E. SAUNDERS, Trans. Ent. Soc. London, 1905, p. 407).

Portuguese East Africa, Nyasaland, North East Rhodesia, Transvaal.—Type locality: "Kola Valley, 1700 ft."

115. *Odynerus melanchrous* F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw., Kl., LXXI, 1, 1907, p. 254; Pl. v, figs. 5, 10, 14, 16, and 19 (♀ ♂).

? *Icaria aterrima* W. F. KIRBY, Bull. Liverpool Mus., III, 1900, p. 23 (♀); Nat. Hist. of Sokotra by H. O. Forbes, Zool. Hym., 1903, p. 256; Pl. xvi, fig. 8 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 73.

Abd el Kuri Island (Sokotra).—Type locality: "Insel Abd el kuri."

116. *Odynerus melanodontus* P. CAMERON, Records Albany Mus., I, 4, 1905, p. 263 (♂). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 487.

Cape Colony.—Type locality: "Dunbrody."

117. *Odynerus melanus* H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 159; Pl. xviii, fig. 9 (♀); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 161 and 172 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 66. DALLA TORRE, Cat., IX, Vesp., 1894, p. 78; Gen. Ins. Vesp., 1904, p. 49.

Madagascar.—Type locality: "Madagascar."

118. *Odynerus mephisto* (GRIBODO).

Rygchium mephisto GRIBODO, Bull. Soc. ent. Italiana, XXIII, 1891, p. 283 (♀).

Rhynchium mephisto DALLA TORRE, Cat., IX, Vesp., 1894, p. 46; Gen. Ins. Vesp., 1904, p. 34.

Sierra Leone.—Type locality: "Sierra Leone."

119. *Odynerus meridionalis* H. DE SAUSSURE, Entom. Zeitg. Stettin, XXIII, 1862, p. 205 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 78; Gen. Ins. Vesp., 1904, p. 49. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 488.

Cape Colony.—Type locality: "le Cap de Bonne-Espérance."

120. *Odynerus metatarsalis* A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, pp. 17 and 21, fig. 10a (♂); Soc. entom., XXIX, 1914, p. 63. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 491.

German East Africa.— Type locality: "Shirati."

121. **Odynerus metemmensis** MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 617 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 78; Gen. Ins. Vesp., 1904, p. 49. FOX, Proc. Ac. Nat. Sc. Philadelphia, XLVIII, 1896, p. 555. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 493.

Nubia, Somaliland.— Type locality: "Metemma."

122. **Odynerus meyeri** P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 184 (♀ ♂). G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 52; Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 494. A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 17.

Rhynchium meyeri P. CAMERON, Ann. Transvaal Mus., II, 3, 1910, p. 163.

East Africa.— Type locality: "Meru low lands, Ngare na nyuki."

122a. var. **albolimbatus** A. v. SCHULTHESS, Soc. entomol., XXIX, 1914, p. 57 (♀ ♂). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 494.

Belgian Congo, Lake Nyasa, Rhodesia, Bechuanaland, Damaraland, Lourenzo Marques.— Type locality: "Nyassasee, Langenburg."

123. **Odynerus mucronatus** H. DE SAUSSURE, Entom. Zeitg. Stettin, XXIII, 1862, p. 203 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 80; Gen. Ins. Vesp., 1904, p. 49. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 490.

Guinea.— Type locality: "la Côte de Guinée."

124. **Odynerus multicolor** H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 209; Pl. XVIII, figs. 11 and 11a (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 72. DALLA TORRE, Cat., IX, Vesp., 1894, p. 80; Gen. Ins. Vesp., 1904, p. 49. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 488 and 497. Senegal.— Type locality: "le Sénégal."

125. **Odynerus multispinosus** (H. DE SAUSSURE).

Rhynchium multispinosum H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 177 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 47. DALLA TORRE, Cat., IX, Vesp., 1894, p. 47; Gen. Ins. Vesp., 1904, p. 34.

Natal.— Type locality: "Port Natal."

126. **Odynerus mutabilis** H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 231; Pl. II, fig. 26 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 81; Gen. Ins. Vesp., 1904, p. 50. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 497.

Abyssinia.— Type locality: "Abyssinie."

127. **Odynerus mutans** H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 288; Pl. XIII, fig. 7 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 81; Gen. Ins. Vesp., 1904, p. 50. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 488 and 497.

Senegal.— Type locality: "la Sénégalie."

128. **Odynerus natalensis** H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 261 (♂); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 175 (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 72. DALLA TORRE, Cat., IX, Vesp., 1894, p. 81; Gen. Ins. Vesp., 1904, p. 50. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 488.

Cape Colony, Natal, (not Madagascar as given by Dalla Torre).— Type locality: "les terres du Cap de Bonne-Espérance."

129. **Odynerus niloticus** (H. DE SAUSSURE).

Rhynchium niloticum H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 181; Pl. xvi, fig. 8 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 47. DALLA TORRE, Cat., IX, Vesp., 1894, p. 47; Gen. Ins. Vesp., 1904, p. 34. F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 250 (♀ ♂).

Egypt, Abyssinia, Southern Arabia, Sokotra.—Type locality: "Abyssinie."

130. **Odynerus nyassæ** (KIRSCH).

Rhynchium nyassæ KIRSCH, Mitth. Zool. Mus. Dresden, III, 1878, p. 378 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 47; Gen. Ins. Vesp., 1904, p. 34. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 32. A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 273.

Nyasa, Delagoa Bay.—Type locality: "Nyassa."

131. **Odynerus oculatus** (FABRICIUS).

Vespa oculata FABRICIUS, Spec. Insect., I, 1781, p. 463. OLIVIER, Encycl. méthod. Ins., VI, 1791, p. 685.

Rygchium oculatum LEPELETIER, Encycl. méthod. Ins., X, 1825, p. 317; Hist. nat. Ins. Hym., II, 1841, p. 680 (♀ ♂). H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 107 (♀ ♂).

Rhynchium oculatum H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 171. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 43. LICHTENSTEIN, Ann. Soc. ent. France, (4), IX, 1869, Bull., p. lxxiii. WALKER, List Hym. Egypt, 1871, p. 30. LUCAS, Ann. Soc. ent. France, (5), IX, 1879, Bull., p. cxlvi. ED. ANDRÉ, Spéc. Hym. Eur. Algér., II, fasc. 21-23, 1884, p. 647; Pl. XLII, figs. 3-6 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 47; Gen. Ins. Vesp., 1904, p. 34. C. T. BINGHAM, Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 110. F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 249. F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, Pl. I, fig. 1.

Rygchium europæum SPINOLA, Insecta Ligur., I, 1806, p. 86 (♀ ♂).

SAVIGNY, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. ix, fig. 10 (♂).

Southern Europe, Egypt, Southern Arabia.—Type locality: "Italia."

131a. var. **somalicus** (MAGRETTI).

Rygchium oculatum var. *somalicum* MAGRETTI, Ann. Mus. civ. Genova, (2), XIX, 1898, p. 594 (♂).

Rhynchium oculatum var. *somalicum* DALLA TORRE, Gen. Ins. Vesp., 1904, p. 34. Abyssinia.—Type locality: "laggo Bass Narok."

132. **Odynerus o'neili** P. CAMERON, Rec. Albany Mus., I, 5, 1905, p. 326 (♀).

G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 488.

Cape Colony.—Type locality: "Dunbrody."

133. **Odynerus oogaster** (GRIBODO).

Rhynchium oogaster GRIBODO, Mem. Ac. Sc. Bologna, (5), V, 2, 1895, Sc. nat., p. 101 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 35.

Mozambique.—Type locality: "Lourenço Marques."

134. **Odynerus osborni** J. BEQUAERT. See p. 141 (♀).

Belgian Congo.—Type locality: Walikale.

135. **Odynerus pakasæ** G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 492 and 506 (♀ ♂).

North Rhodesia, Portuguese East Africa, German South West Africa.—Type locality: "N. Rhodesia: Pakasa."

136. **Odynerus penetratus** P. CAMERON, Ann. Transvaal Mus., II, 3, 1910,

p. 164 (♀). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 488.

Transvaal.—Type locality: "Rietfontein."

137. **Odynerus perfidiosus** (P. CAMERON).

Rhynchium perfidiosum P. CAMERON, Ann. Transvaal Mus., II, 3, 1910, p. 161 (♀ ♂).

Transvaal.—Type locality: "Waterkloof."

138. **Odynerus picturatus** J. BEQUAERT. See p. 137 (♂).

Belgian Congo.—Type locality: Thysville.

139. **Odynerus politictypeus** A. v. SCHULTHESS, Soc. entomol., XXIX, 1914, p. 73, fig. (♀). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 498 and 516; Pl. xci, fig. 14 (♀).

Nyasaland, Katanga, Bechuanaland.—Type locality: "Bunkeya."

140. **Odynerus pseudolateralis** G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 494 and 509 (♀ ♂).

Northern Nigeria, Gambia, Belgian Congo.—Type locality: "N. Nigeria: Minna."

141. **Odynerus pulchellus** (A. GERSTÆCKER) G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 494 and 509.

Rhynchium pulchellum A. GERSTÆCKER, Monatsb. k. Preuss. Ak. Wiss. Berlin, 1857, p. 463 (♂); in Peters, Reise n. Mossambique, Zool., V, 1862, p. 466; Pl. xxx, fig. 5 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 47; Gen. Ins. Vesp., 1904, p. 35.

Mozambique, Nyasaland, North Rhodesia, German and British East Africa.—Type locality: "Inhambane."

142. **Odynerus pulchripiloselloides** A. v. SCHULTHESS, Soc. entom., XXIX, 1914, pp. 63 and 72 (♀).

Delagoa Bay.—Type locality: "Rikatla."

143. **Odynerus pulchripilosellus** P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 186 (♀). A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 16 (♀ ♂); Soc. entomol., XXIX, 1914, pp. 63 and 72 (♀ ♂). G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 52; Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 491 and 503.

East Africa, Nyasaland, Eritrea, North East Rhodesia, Transvaal, Delagoa Bay, Natal.—Type locality: "Kilimandjaro: Kibonoto, 1000-1300 m."

144. **Odynerus punctatipennis** H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 210 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 91; Gen. Ins. Vesp., 1904, p. 52. C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), X, 1902, p. 221.

India, Nyasaland, Natal.—Type locality: "les Indes orientales?"

145. **Odynerus quadri-tuberculatus** F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 70 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 92; Gen. Ins. Vesp., 1904, p. 52. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 491 and 503; Pl. xci, fig. 3. A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 17; Soc. entomol., XXIX, 1914, pp. 63 and 72 (♀ ♂).

Natal, North Transvaal.—Type locality: "Port-Natal."

146. **Odynerus radialis** (H. DE SAUSSURE).

Rhynchium radiale H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 179. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 47. RADOSZKOWSKY, Journ. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 207. DALLA TORRE, Cat., IX, Vesp., 1894, p. 47; Gen. Ins. Vesp., 1904, p. 35.

Natal, Angola.— Type locality: "Port-Natal."

147. **Odynerus rhizophorarum** J. BEQUAERT. See p. 192 (♂).

Belgian Congo.— Type locality: Malela.

148. **Odynerus rhynchoides** H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 174; Pl. xvii, fig. 12 (♂); III, Suppl., 1854, p. 231. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 72. MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 619. DALLA TORRE, Cat., IX, Vesp., 1894, p. 93; Gen. Ins. Vesp., 1904, p. 53. R. DU BUYSSON, Actes Soc. Linn. Bordeaux, LXIV, 1910, p. 228. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 494 and 509.

Odynerus interruptus H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 221 (♀) (*nec* BRULLÉ, 1832).

Odynerus saussurei ED. ANDRÉ, Spéc. Hym. Eur. Algér., II, fasc. 21-23, 1884, p. 682 (♀). MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 620. DALLA TORRE, Cat., IX, Vesp., 1894, p. 95; Gen. Ins. Vesp., 1904, p. 54.

SAVIGNY, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. ix, fig. 17 (♀).

Gambia, Senegal, Mauritania, Algerian Sahara (Biskra), White Nile, Straits of Bab el Mandeb (Tajura), Egypt, Abyssinia.— Type locality: "le Sénégal."

149. **Odynerus rikatlensis** A. v. SCHULTHESS, Soc. entomol., XXIX, 1914, pp. 63 and 72 (♂). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 491.

Delagoa Bay.— Type locality: "Rikatla."

150. **Odynerus rotundiscutis** P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 185 (♀ ♂). G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 53; Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 497. A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 18.

Odynerus meruensis P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 186 (♂). G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 53; Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 488 and 497. A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 18.

East Africa.— Type locality: "Meru low lands, Ngara na nyuki."

151. **Odynerus rubellulus** F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 255; Pl. V, figs. 8, 12, 13, and 17 (♀ ♂).

Semha Island.— Type locality: "Insel Sémha."

152. **Odynerus rubens** (H. DE SAUSSURE).

Rhynchium rubens H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 181 (♀ ♂). F. SMITH, Cat. Hym. Brit. Mus., V, 1857, p. 46. GERSTÆCKER, in Peters, Reise n. Mossambique, Zool., V, 1862, p. 466 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 48; Gen. Ins. Vesp., 1904, p. 35. A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 273.

Cape Colony, Delagoa Bay.— Type locality: "Cap de Bonne-Espérance."

153. **Odynerus rubroniger** C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), X, 1902, p. 222 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 53. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 491.

Transvaal.— Type locality: "Pretoria."

154. **Odynerus rufiventris** (RADOSZKOWSKY).

Rhynchium rufiventre RADOSZKOWSKY, Jorn. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 206 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 48; Gen. Ins. Vesp., 1904, p. 35.

Angola.— Type locality: "Angola."

Probably a synonym of *O. rubens* (Saussure).

155. **Odynerus rufoniger** J. BEQUAERT. See p. 164 (♀).

Belgian Congo.—Type locality: Stanleyville.

156. **Odynerus sakalavus** H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 161 and 169; Pl. xxii, fig. 4 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 95; Gen. Ins. Vesp., 1904, p. 53.

Nossi Bé.—Type locality: "Nosibé."

157. **Odynerus schönlandi** P. CAMERON, Rec. Albany Mus., I, 4, 1905, pp. 203 and 264 (♀). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 487.

Cape Colony.—Type locality: "Brak Kloof."

158. **Odynerus schubotzianus** (A. v. SCHULTHESS).

Rhynchium schubotzianum A. v. SCHULTHESS, Wiss. Ergebn. D. Z. Afrik. Exp., (1907-08), IV, Lf. 10, 1912, p. 293, figs. 1-3 (♀ ♂); Soc. entomol., XXVIII, 1913, p. 2; Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 345, figs. 2-4; Deutsche entom. Zeitschr., 1914, p. 292.

Belgian Congo (Ituri), Lake Nyasa.—Type locality: "Nyassa-See, Langenburg."

159. **Odynerus schulthessi** G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 497 and 514; Pl. xci, fig. 11 (♀).

British East Africa.—Type locality: "Kuja Valley, S. Kavirondo."

160. **Odynerus schultzeanus** A. v. SCHULTHESS, Soc. entomol., XXIX, 1914, p. 57 (♀ ♂). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 495.

Damaraland.—Type locality: "Lüderitzbucht."

161. **Odynerus scripticeps** P. CAMERON, Ann. Transvaal Mus., II, 3, 1910, p. 167 (♀). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 496; Pl. xci, fig. 9.

Transvaal.—Type locality: "Kranspoort."

162. **Odynerus senex** P. CAMERON, Rec. Albany Mus., I, 5, 1905, p. 324 (♂). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 486 and 492.

Cape Colony.—Type locality: "Dunbrody."

163. **Odynerus sesquicinctus** H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 299 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 96; Gen. Ins. Vesp., 1904, p. 54. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 487.

Cape Colony.—Type locality: "le Cap de Bonne-Espérance."

164. **Odynerus seychellensis** DALLA TORRE, Gen. Ins. Vesp., 1904, p. 54. G. MEADE WALDO, Trans. Linn. Soc. London, (2), XV, Zool., pt. 1, 1912, p. 43.

Odynerus cylindricus J. PÉREZ, Ann. Soc. ent. France, LXIV, 1895, p. 207 (♀). P. CAMERON, Trans. Linn. Soc. London, (2), XII, Zool., pt. 1, 1907, p. 72 (♂). (*nec O. cylindricus* SAUSSURE, 1862).

Odynerus neonymus W. A. SCHULZ, Spolia Hymenopterologica, 1906, p. 218.

Seychelles Islands, Amirantes Islands.—Type locality: "Mahé."

165. **Odynerus sheffeldi** G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 497 and 515 (♀ ♂).

Northern Nigeria, North East Rhodesia, Nyasaland, Portuguese East Africa, Belgian Congo.—Type locality: "Mlanje."

165a. var. **marginifasciatus** J. BEQUAERT. See p. 176 (♀).

Belgian Congo.—Type locality: Faradje.

166. *Odynerus signatus* H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 258 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 74. DALLA TORRE, Cat., IX, Vesp., 1894, p. 96; Gen. Ins. Vesp., 1904, p. 54. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 493.

South Africa.—Type locality: "l'Afrique méridionale."

167. *Odynerus signiferus* (P. CAMERON).

Rhynchium signiferum P. CAMERON, Ann. Transvaal Mus., II, 3, 1910, p. 160 (♂).

Transvaal.—Type locality: "Waterval."

168. *Odynerus silaos* H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 213; Pl. XIX, fig. 6 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 96; Gen. Ins. Vesp., 1904, p. 54. A. v. SCHULTHESS, Soc. entomol., XXIX, 1914, p. 63.

Odynerus silaensis H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 244; Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 233; in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 161 and 172 (♀ ♂); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 239. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 71. A. v. SCHULTHESS, Reise Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 72; Ark. f. Zool., VIII, No. 17, 1913, pp. 15 and 16. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 492. P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 190.

Abyssinia, German East Africa (Pemba Island), Cape Colony, Réunion, Madagascar, Nossi Bé.—Type locality: "l'île Bourbon."

168a. var. *asmarensis* A. v. SCHULTHESS, Soc. entomol., XXIX, 1914, p. 63 (♀ ♂).

Odynerus asmarensis G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 493 and 507 (♀ ♂).

Eritrea.—Type locality: "Asmara."

168b. var. *ukerewensis* A. v. SCHULTHESS, Soc. entomol., XXIX, 1914, p. 63 (♀).

Odynerus ukerewensis G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 493 (♀).

German East Africa.—Type locality: "Ukerewe."

169. *Odynerus silverlocki* G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 492 and 505; Pl. xci, figs. 4a and 4b (♀).

Northern Rhodesia.—Type locality: "85 miles west of Kariba Gorge."

170. *Odynerus simonyi* (F. KOHL).

Rhynchium simonyi F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 251; Pl. VIII, figs. 6, 7, and 18 (♂).

Southern Arabia.—Type locality: "Rhas Farták."

171. *Odynerus simplidentatus* G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), VI, 910, p. 107 (♂); Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 496.

Mashonaland.—Type locality: "Salisbury."

172. *Odynerus sirdari* (F. D. MORICE).

Rhynchium sirdari F. D. MORICE, Ann. Mag. Nat. Hist., (7), XII, 1903, p. 612 (♂); Res. Swed. Zool. Exp. Jägerskiöld, pt. I, 1904, Hym. ac., p. 4.

Egyptian Sudan.—Type locality: "Khartum."

173. *Odynerus sjöstedti* P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 188 (♀). G. MEADE WALDO, Ann. Mag. Nat. Hist.

(8), XI, 1913, p. 53; Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 492 and 507. A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 15, fig. 10b (♀ ♂).

East Africa, Nyasaland.—Type locality: "Usambara: Mombo."

174. *Odynerus socotræ* F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 257; Pl. v, figs. 1 and 4 (♀ ♂).

Sokotra Island.—Type locality: "Ras Shoab."

175. *Odynerus solstitialis* H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 298 (♂). MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 620 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 97; Gen. Ins. Vesp., 1904, p. 54. GRIBODO, Mem. Ac. Sc. Bologna, (5), V, 2, 1895, Sc. nat., p. 103 (♀). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 494.

Cape Colony, Mozambique.—Type locality: "le Cap de Bonne-Espérance."

176. *Odynerus spoliatus* P. CAMERON, Ann. Transvaal, Mus., II, 3, 1910, p. 165 (♀ ♂). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 497 and 511; Pl. xci, fig. 12.

Odynerus longstaffi C. T. BINGHAM, Trans. Ent. Soc. London, 1912, p. 378 (♂). G. B. LONGSTAFF, Butterfly Hunting in many Lands, 1912, Pl. II, fig. 6.

Cape Colony, Transvaal, Natal, Mashonaland.—Type locality: "Kranspoort."

177. *Odynerus stellenboschensis* P. CAMERON, Trans. South African Philos. Soc., XV, pt. 4, 1905, p. 233 (♂).

Odynerus stellaboschensis G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 496.

Cape Colony.—Type locality: "Stellenbosch."

178. *Odynerus stigma* H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 219 (♂). ED. ANDRÉ, Spéc. Hym. Eur. Algér., II, fasc. 21-23, 1884, p. 681 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 99; Gen. Ins. Vesp., 1904, p. 55.

SAVIGNY, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. ix, fig. 12 (♀).

Abyssinia, Egypt.—Type locality: "Abyssinie."

179. *Odynerus synagroides* (H. DE SAUSSURE).

Rygchium synagroides H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 103; Pl. xiv, figs. 2 and 2a (♂).

Rhynchium synagroides F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 46. H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 207 (♀); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 174; Pl. iv, figs. 13 and 14 (♀ ♂). RADOSZKOWSKY, Journ. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 205. DALLA TORRE, Cat., IX, Vesp., 1894, p. 48; Gen. Ins. Vesp., 1904, p. 35. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 32. C. T. BINGHAM, Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 110; Ann. Mag. Nat. Hist., (7), X, 1902, p. 221. A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 272; Wiss. Ergebn. D. Z. Afrik. Exp., (1907-08), IV, Lg. 10, 1912, p. 293; Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 344. E. ROUBAUD, Ann. Sc. nat. Zool., (10), I, 1, 1916, p. 32 (ethology).

Rhynchium sichelii H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 176 (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 46. DALLA TORRE, Cat., IX, Vesp., 1894, p. 48; Gen. Ins. Vesp., 1904, p. 35.

Synagris odontophora A. SCHLETTERER, Ann. Soc. ent. Belgique, XXXV, 1891, p. 21; Pl. I, figs. 1 and 2 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31.

Rhynchium odontophorum F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 250.

Bassam, Bas-Dahomey, Gaboon, Spanish Guinea, Belgian Congo, Angola, Cape Colony, Transvaal, Delagoa Bay, Southern Arabia.— Type locality: "Gabon."

180. **Odynerus tectus** (FABRICIUS) H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 258. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 74. DALLA TORRE, Cat., IX, Vesp., 1894, p. 100; Gen. Ins. Vesp., 1904, p. 55. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 494.

Vespa tecta FABRICIUS, Spec. Insect., I, 1781, p. 466.

Africa.— Type locality: "in Africa æquinoctiali."

181. **Odynerus tessmannianus** (A. v. SCHULTHESS).

Rhynchium tessmannianum A. v. SCHULTHESS, Soc. entomol., XXVIII, 1913, p. 2 (♀); Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 346, figs. 5 and 6 (♀); Deutsche entom. Zeitschr., 1914, p. 292.

Spanish Guinea.— Type locality: "Uelleburg."

182. **Odynerus trilobus** (FABRICIUS) LEPELETIER, Hist. nat. Ins. Hym., II, 1841, p. 635 (♀ ♂). H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 186; III, Suppl., 1854, p. 232; Reise d. Novara, Zool., II, 1, 1867, Hym., p. 10 (♀); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 161 and 164; Pl. iv, fig. 15 (♀ ♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 66. DALLA TORRE, Cat., IX, Vesp., 1894, p. 102; Gen. Ins. Vesp., 1904, p. 56. G. MEADE WALDO, Trans. Linn. Soc. London, (2), XV, Zool., pt. 1, 1912, p. 43.

Vespa triloba FABRICIUS, Mant. Insect., I, 1787, p. 290.

Odynerus chagosensis P. CAMERON, Trans. Linn. Soc. London, (2), XII, Zool., pt. 1, 1907, p. 73 (♀ ♂).

Odynerus cænocephalus P. CAMERON, Trans. Linn. Soc. London, (2), XII, Zool., pt. 1, 1907, p. 72 (♀ ♂).

Madagascar, Mauritius, Réunion, Chagos Island, (East Indies, China, South Africa?, Ténériffe?).— Type locality: "China."

183. **Odynerus tripunctatus** (FABRICIUS) LEPELETIER, Hist. nat. Ins. Hym., II, 1841, p. 620 (♀ ♂). H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 196; III, Suppl., 1854, p. 240. ED. ANDRÉ, Spéc. Hym., Eur. Algér., II, fasc. 24-26, 1886, p. 892. DALLA TORRE, Cat., IX, Vesp., 1894, p. 102; Gen. Ins. Vesp., 1904, p. 56.

Vespa tripunctata FABRICIUS, Mant. Insect., I, 1787, p. 290.

Algeria, Egypt.— Type locality: "in Babaria."

184. **Odynerus troglodytes** H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 249 (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 72. DALLA TORRE, Cat., IX, Vesp., 1894, p. 103; Gen. Ins. Vesp., 1904, p. 56. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 488.

Senegal.— Type locality: "le Sénégal."

185. **Odynerus tropicalis** H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 214; Pl. XIX, fig. 5 (♀ ♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 74. DALLA TORRE, Cat., IX, Vesp., 1894, p. 103; Gen. Ins. Vesp., 1904, p. 56. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 494. A. v. SCHULTHESS, Soc. entomol., XXIX, 1914, p. 63. E. ROUBAUD, Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 37-43 (ethology).

Abyssinia, Belgian Congo, Dahomey.— Type locality: "l'Abyssinie."

186. **Odynerus ueleensis** J. BEQUAERT. See p. 170 (♀ ♂).

Belgian Congo.— Type locality: Vankercckhovenille.

187. *Odynerus uncatus* (A. TULLGREN).

Synagris uncata A. TULLGREN, Ark. f. Zool., I, 1904, p. 449; Pl. xxv, figs. 11 a-b (♀).

Rhynchium uncatum F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 316.

Cameroon.— Type locality: "Kitta."

188. *Odynerus vaalensis* P. CAMERON, The Entomologist, XXXVIII, 1905, p. 153 (♂). G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 495.

Transvaal.— Type locality: "Transvaal."

189. *Odynerus ventralis* H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 161 and 173; Pl. iv, fig. 17; Pl. xvii, figs. 9 and 9c (♀ ♂).

Odynerus synagroides H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 198; Pl. xviii, fig. 2 (♀); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 223 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 72. GRIBODO, Ann. Mus. civ. Genova, XXI, 1884, p. 289 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 99; Gen. Ins. Vesp., 1904, p. 55. W. A. SCHULZ, Zoolog. Ann. Würzburg, IV, 1911, p. 199.

Synagris tropidia A. SCHLETTERER, Ann. Soc. ent. Belgique, XXXV, 1891, p. 20; Pl. i, figs. 3 and 5 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31. Fox, Proc. Ac. Nat. Sc. Philadelphia, XLVIII, 1896, p. 554.

Rhynchium tropidium F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 250; Pl. v, figs. 22, 27, and 29.

Senegal, Gaboon, Belgian Congo, Abyssinia, Somaliland, Madagascar.— Type locality: "le Sénégal."

190. *Odynerus versicolor* (W. F. KIRBY) A. v. SCHULTHESS, Soc. entomol., XXIX, 1914, p. 57.

Rhynchium versicolor W. F. KIRBY, Bull. Liverpool Mus., III, 1900, p. 19 (♀); Nat. Hist. of Sokotra, by H. O. Forbes, Zool. Hym., 1903, p. 247; Pl. xv, fig. 12 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 35. F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 249.

Odynerus stiraspis P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 187 (♂). G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 52; Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, pp. 487, 488, 492, and 496. A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 17.

Odynerus wellmani G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), VI, 1910, p. 106 (♀); Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 497.

Sokotra Island, British and German East Africa, Katanga, Angola, Northern Transvaal.— Type locality: "Homhil, East Sokotra, 1500 ft."

191. *Odynerus vulneratus* H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 248 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 104; Gen. Ins. Vesp., 1904, p. 57. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 493.

Cape Colony (?).— Type locality: "l'Espagne ou le Cap de Bonne-Espérance."

192. *Odynerus walkeri* (DALLA TORRE).

Rhynchium walkeri DALLA TORRE, Gen. Ins. Vesp., 1904, p. 35.

Rhynchium ardens WALKER, List Hym. Egypt, 1871, p. 31 (♀ ♂) (*nec* GUÉRIN, 1848). DALLA TORRE, Cat., IX, Vesp., 1894, p. 43.

Arabia.— Type locality: "Mount Sinai."

193. *Odynerus whiteanus* P. CAMERON, Trans. South African Philos. Soc.,

XV, 4, 1905, p. 232 (♀ ♂); Rec. Albany Mus., I, 5, 1905, p. 325. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 492.

Cape Colony.—Type locality: "Grahamstown."

194. **Odynerus xanthurus** (H. DE SAUSSURE).

Rhynchium xanthurum H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 182 (♀); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 209 (♀ ♂); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 173; Pl. iv, fig. 12 (♀ ♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 46. DALLA TORRE, Cat., IX, Vesp., 1894, p. 48; Gen. Ins. Vesp., 1904, p. 35.

Cape Colony, Caffraria.—Type locality: "Cap de Bonne-Espérance."

195. **Odynerus yngvei** P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 188 (♂). A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 18.

East Africa.—Type locality: "Kilimandjaro: Kibonoto, 1300-1900 m."

I have followed A. v. Schulthess in considering *O. yngvei* as distinct from *O. sjöstedti* Cameron. G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 53, unites both as different sexes of the same species.

196. **Odynerus zonatus** (WALKER).

Rhynchium zonatum WALKER, List Hym. Egypt, 1871, p. 31 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 48; Gen. Ins. Vesp., 1904, p. 35.

Arabia.—Type locality: "Wady Ferran."

The following African species of *Odynerus* can not be placed in their subgenera.

197. **Odynerus albifer** WALKER, List Hym. Egypt, 1871, p. 36 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 51; Gen. Ins. Vesp., 1904, p. 39.

Egypt.—Type locality: "Cairo."

198. **Odynerus alienus** WALKER, List Hym. Egypt, 1871, p. 39 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 51; Gen. Ins. Vesp., 1904, p. 39.

Arabia.—Type locality: "Wady Gennèh."

199. **Odynerus cingulifer** WALKER, List Hym. Egypt, 1871, p. 37 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 60; Gen. Ins. Vesp., 1904, p. 42.

Egypt.—Type locality: "Harkeko."

200. **Odynerus cognatus** WALKER, List Hym. Egypt, 1871, p. 35 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 61; Gen. Ins. Vesp., 1904, p. 42.

Arabia.—Type locality: "Wady Ferran."

201. **Odynerus concinnulus** WALKER, List Hym. Egypt, 1871, p. 38 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 61; Gen. Ins. Vesp., 1904, p. 42.

Egypt.—Type locality: "Dahleck (Island)."

202. **Odynerus disjunctus** WALKER, List Hym. Egypt, 1871, p. 39 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 65; Gen. Ins. Vesp., 1904, p. 44.

Egypt.—Type locality: "Cairo."

203. **Odynerus diversus** WALKER, List Hym. Egypt, 1871, p. 34 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 65; Gen. Ins. Vesp., 1904, p. 44.

Arabia.—Type locality: "Wady Gennèh."

204. **Odynerus dotatus** WALKER, List Hym. Egypt, 1871, p. 35 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 65; Gen. Ins. Vesp., 1904, p. 44.

Arabia.—Type locality: "Wady Gennèh."

205. **Odynerus exustus** WALKER, List Hym. Egypt, 1871, p. 35 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 67; Gen. Ins. Vesp., 1904, p. 45.

Arabia.—Type locality: "Mount Sinai."

206. **Odynerus flavus** WALKER, List Hym. Egypt, 1871, p. 33 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 69; Gen. Ins. Vesp., 1904, p. 45.
Arabia.— Type locality: "Wādy Ferran."
207. **Odynerus fumipennis** WALKER, List Hym. Egypt, 1871, p. 38 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 69; Gen. Ins. Vesp., 1904, p. 45.
Egypt.— Type locality: "Cairo."
208. **Odynerus guttulosus** WALKER, List Hym. Egypt, 1871, p. 36 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 71; Gen. Ins. Vesp., 1904, p. 46.
Egypt.— Type locality: "Harkeko."
209. **Odynerus humbei** RADOSZKOWSKY, Journ. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 205 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 73; Gen. Ins. Vesp., 1904, p. 47. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 489.
Angola.— Type locality: "Angola."
210. **Odynerus inornatus** WALKER, List Hym. Egypt, 1871, p. 37 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 74; Gen. Ins. Vesp., 1904, p. 47.
Egypt.— Type locality: "Cairo."
211. **Odynerus instabilis** F. SMITH, Cat. Hym. Brit. Mus., V, 1857, p. 73 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 74; Gen. Ins. Vesp., 1904, p. 47. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 503.
Gambia.— Type locality: "Gambia."
212. **Odynerus notabilis** WALKER, List Hym. Egypt, 1871, p. 38 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 82; Gen. Ins. Vesp., 1904, p. 50.
Egypt.— Type locality: "Dahleck (Island)."
213. **Odynerus obscurus** RADOSZKOWSKY, Journ. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 204 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 83; Gen. Ins. Vesp., 1904, p. 50. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 489.
Angola.— Type locality: "Angola."
214. **Odynerus privatus** WALKER, List Hym. Egypt, 1871, p. 34 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 90; Gen. Ins. Vesp., 1904, p. 52.
Arabia.— Type locality: "Wādy Gennèh."
215. **Odynerus raffrayi** RADOSZKOWSKY, Hor. Soc. Ent. Rossicæ, XII, 2, 1876, p. 145 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 92; Gen. Ins. Vesp., 1904, p. 52. G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 489.
Abyssinia.— Type locality: "Abyssinie."
216. **Odynerus rotundatus** WALKER, List Hym. Egypt, 1871, p. 37 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 94; Gen. Ins. Vesp., 1904, p. 53.
Egypt.— Type locality: "Cairo."
217. **Odynerus selectus** WALKER, List Hym. Egypt, 1871, p. 34 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 96; Gen. Ins. Vesp., 1904, p. 54.
Arabia.— Type locality: "Mount Sinai."
218. **Odynerus stipatus** WALKER, List Hym. Egypt, 1871, p. 36 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 99; Gen. Ins. Vesp., 1904, p. 55.
Egypt.— Type locality: "Cairo?"
219. **Odynerus tegularis** P. CAMERON, Ann. Transvaal Mus., II, 3, 1910, p. 164 (♀). (nec MORAWITZ, 1885; nec CAMERON, 1905).
Transvaal.— Type locality: "Saleka."

Cameron used for two different new species the preoccupied name "*tegularis*"; the first of these species has been renamed *cameroni* by Schulz, 1906; I refrain from renaming the other, because it may prove a synonym of some other described form, or even not belong to the genus *Odynerus*.

220. ***Odynerus tinctus*** WALKER, List Hym. Egypt, 1871, p. 34 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 101; Gen. Ins. Vesp., 1904, p. 56.

Arabia.—Type locality: "Wādy Gennèh."

221. ***Odynerus torridus*** WALKER, List Hym. Egypt, 1871, p. 33 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 101; Gen. Ins. Vesp., 1904, p. 56.

Arabia.—Type locality: "Mount Sinai."

21. ***Pterochilus*** KLUG

In Weber and Mohr, Beiträge z. Naturk., I, 1805, p. 143.

Pterochilus PANZER, Rev. Insectf. Deutschl., II, 1806, p. 145.

Genotype: *Vespa phalerata* Panzer, 1797.

1. ***Pterochilus biglumis*** H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 243; Pl. XXI, fig. 3 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 87. DALLA TORRE, Cat., IX, Vesp., 1894, p. 105; Gen. Ins. Vesp., 1904, p. 58.

Cape Colony (?).—Type locality: "le Cap de Bonne-Espérance?"

2. ***Pterochilus capensis*** H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 323; Pl. xv, figs. 11 and 11a (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 88. DALLA TORRE, Cat., IX, Vesp., 1894, p. 105; Gen. Ins. Vesp., 1904, p. 58.

Cape Colony.—Type locality: "le Cap de Bonne-Espérance."

3. ***Pterochilus dives*** RADOSZKOWSKY, Hor. Soc. ent. Rossicæ, XII, 1876, p. 145 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 106; Gen. Ins. Vesp., 1904, p. 58. Egypt.—Type locality: "Egypte."

4. ***Pterochilus eurystomus*** (F. KOHL).

Pterochilus eurystomus F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 257; Pl. II, fig. 9; Pl. v, figs. 9 and 11; Pl. VIII, fig. 15 (♀).

Sokotra Island.—Type locality: "Ras Shoab."

5. ***Pterochilus insignis*** H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 324; Pl. xv, figs. 12 and 12a (♀ ♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 88. DALLA TORRE, Cat., IX, Vesp., 1894, p. 106; Gen. Ins. Vesp., 1904, p. 58. W. L. DISTANT, A Naturalist in the Transvaal, 1892, p. 210.

Odynerus insignis C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), XII, 1903, p. 46.

Cape Colony, Transvaal.—Type locality: "le Cap de Bonne-Espérance."

6. ***Pterochilus iterabilis*** (F. KOHL).

Pterochilus iterabilis F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 259; Pl. II, fig. 12; Pl. VIII, figs. 2, 13, and 14 (♀).

Egypt.—Type locality: "Wady Hoff, Helouah."

7. ***Pterochilus major*** H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 244; Pl. XXI, fig. 1 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 87. DALLA TORRE, Cat., IX, Vesp., 1894, p. 107; Gen. Ins. Vesp., 1904, p. 58.

Cape Colony.—Type locality: "le Cap de Bonne-Espérance."

8. ***Pterochilus savignyi*** H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 248 (♀) (without description).

SAVIGNY, Descr. Egypte, Atlas, Zool., Ins. Hym., 1812, Pl. VIII, fig. 8 (♀).

Egypt.—Type locality: unknown.

9. **Pterochilus versicolor** A. v. SCHULTHESS, Soc. entomol., XXIX, 1914, p. 78, fig. (♀).

Southeastern Belgian Congo (Katanga).—Type locality: "Bunkeya."

Odynerus adonis G. MEADE WALDO is probably a synonym of this species.

22. **Synagris** LATREILLE

Hist. nat. Crust. Ins., III, (an X), 1802, p. 360.

Genotype: *Vespa cornuta* Linné, 1758.

Subgenus 1. **Pseudagris** H. DE SAUSSURE

Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 203 (as a division). F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 243 (as a subgenus).

Type: *Synagris carinata* H. de Saussure, 1863.

1. **Synagris aterrima** F. MAIDL, Anzeiger Ak. Wiss. Wien, 1914, p. 97 (♀); Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 235 and 246; Pl. I, fig. 2; Pl. II, fig. 9 (♀).

Eastern Belgian Congo.—Type locality: "Urwald Moera."

2. **Synagris carinata** H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 203, Pl. II, figs. 18c and 18m (♀, erroneously described as ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 35; Gen. Ins. Vesp., 1904, p. 30. F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 235 and 244 (♀).

Natal.—Type locality: "Port Natal."

3. **Synagris versicolor** A. v. SCHULTHESS, Soc. entomol., XXIX, 1914, p. 4 (♀); Deutsche entom. Zeitschr., 1914, p. 291. F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 235 and 244 (♀).

Sierra Leone, Togo, Cameroon, Belgian Congo, Fernando Po.—Type locality: "Sierra Leone."

3a. var. **meade-waldoi** F. MAIDL, Anzeiger Ak. Wiss. Wien, 1914, p. 97 (♀); Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 235 and 245 (♀).

Uganda.—Type locality: "Budongo Forest, Unyoro."

Subgenus 2. **Rhynchagris** F. MAIDL

Anzeiger Ak. Wiss. Wien, 1914, p. 97; Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 247.

Type: *Synagris vicaria* Stadelmann, 1898.

4. **Synagris vicaria** H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., pp. 29 and 32 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 31. F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 222, fig. 3; p. 227, fig. 18; pp. 235, 239, and 248; Pl. I, fig. 3; Pl. II, figs. 10 and 11 (♀ ♂).

Belgian Congo (Katanga), German East Africa, North East Rhodesia, Nyasaland.—Type locality: "Deutsch-Ostafrika."

4a. var. *luteopicta* F. MAIDL, Anzeiger Ak. Wiss. Wien, 1914, p. 97 (♀ ♂); Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 235, 239, and 249 (♀ ♂).

Uganda, British and German East Africa.—Type locality: "south of Lake George."

Subgenus 3. *Paragris* H. DE SAUSSURE.

Et. fam. Vesp., III, Suppl., 1854, p. 156 (as a division). F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 525 (as a subgenus).

Synagris divisio Hypagris H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 157.

Synagris divisio Antagris H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 181.

Type: *Synagris analis* H. de Saussure, 1852.

5. *Synagris abyssinica* GUÉRIN, in Lefebvre, Voy. Abyssinie, IV, Zool., pt. VI, 1848, p. 360 (♀ ♂). REICHE et FAIRMAIRE, in Ferret et Galinier, Voy. Abyssinie, III, 1849, p. 453; Atlas, Zool., Pl. XXIX, figs. 9 and 10 (♂). H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 84 (♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 192. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 37. RADOSZKOWSKY, Journ. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 203. DALLA TORRE, Cat., IX, Vesp., 1894, p. 34; Gen. Ins. Vesp., 1904, p. 30. E. CANNAVIELLO, Bull. Soc. ent. Italiana, XXXII, 1900, p. 297. F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 227, fig. 17; pp. 235, 239, and 273; Pl. iv, figs. 41 and 42 (♀ ♂).

Synagris aethiopica H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 200; Pl. II, fig. 14 (♀). G. GRIBODO, Ann. Mus. civ. Genova, XXI, 1884, p. 292. DALLA TORRE, Cat., IX, Vesp., 1894, p. 34; Gen. Ins. Vesp., 1904, p. 30.

Synagris ferrida H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 199; Pl. II, fig. 13 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 36; Gen. Ins. Vesp., 1904, p. 31.

Synagris minuta H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 85; Pl. v, fig. 2c; Pl. XIII, figs. 7 and 7 a-b (♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 192; Pl. II, fig. 8 (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 37. DALLA TORRE, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31. A. v. SCHULTHESS, Wiss. Ergebn. D. Z. Afrik. Exp. (1907-08), IV, Lf. 10, 1912, p. 292.

Synagris pentameria H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 87; Pl. XIII, figs. 8 and 8 a-b (♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 197 (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 37. GRIBODO, Ann. Mus. civ. Genova, XVI, 1881, p. 240. DALLA TORRE, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31; Pl. III, fig. 8.

Synagris xanthura P. CAMERON (*pro parte*), Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 183 (see A. v. Schulthess, Ark. f. Zool., VIII, Nö. 17, 1913, p. 14).

Abyssinia, Uganda, Northeastern Belgian Congo, British East Africa, Transvaal, Orange Colony, Natal, Cape Colony, German Southwest Africa.—Type locality: "Abyssinie."

5a. var. **albofasciata** F. MAIDL, Anzeiger Ak. Wiss. Wien, 1914, p. 98 (♀ ♂); Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 238, 242, and 275 (♀ ♂).

British East Africa, Northeastern Belgian Congo (Angola ?, Guinea?).—Type locality: "Nyangori N. Kavirondo."

5b. var. **emarginata** (H. DE SAUSSURE) F. Maidl, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 236, 240, and 275 (♀ ♂).

Synagris emarginata H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 157 (♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 195. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 37. RADOSZKOWSKY, Journ. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 203. DALLA TORRE, Cat., IX, Vesp., 1894, p. 36; Gen. Ins. Vesp., 1904, p. 31. C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), XII, 1903, pp. 47 and 68.

Abyssinia, Belgian Congo (Katanga, northeastern districts, Lower Congo), Uganda, British and German East Africa, North East Rhodesia, Nyasaland, (Madagascar?).—Type locality: "l'Afrique."

6. **Synagris æstuans** (FABRICIUS) SERVILLE, in Palisot de Beauvois, Ins. recueillis en Afrique et Amérique, 1805, p. 260; Atlas, Hymén., Pl. x, fig. 5 (♀). LEPELETIER, Encycl. méthod. Insect., X, 1825, p. 510 (♀); Hist. nat. Ins. Hym., II, 1841, p. 594 (♀). H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 81 (♀ ♂); III, Suppl., 1854, p. 155; Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 188 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 36. DALLA TORRE, Cat., IX, Vesp., 1894, p. 34; Gen. Ins. Vesp., 1904, p. 30. W. A. SCHULZ, Spolia Hymenopterologica, 1906, pp. 215 and 321. A. v. SCHULTHESS, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 343. F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 239, 243, and 283; Pl. iv, figs. 47 and 48 (♀ ♂).

Vespa æstuans FABRICIUS, Spec. Insect., II, 1781, p. 462 (♀); Mant. Insect., I, 1787, p. 289 (♀); Syst. Piez., 1804, p. 258 (♀). GMELIN, in Linné, Syst. Nat., ed. 13a, I, 5, 1790, p. 2752 (♀). OLIVIER, Encycl. méthod. Insect., VI, 1791, p. 683 (♀).

Synagris amplissima F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 337; Pl. xv, fig. 93; Pl. xvi, fig. 102 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 34; Gen. Ins. Vesp., 1904, p. 30. J. C. BRIDWELL, Proc. Hawaiian Ent. Soc., III, 4, (1916), 1917, p. 261.

Synagris ornata A. MOCÁRY, Ann. Mus. nat. Hungarici, IV, 1906, p. 199 (♀).

Sierra Leone, Togo, Cameroon, Fernando Po, French Congo, Belgian Congo, Uganda.—Type locality: "in Africa æquinoctiali."

6a. var. **rufa** H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., pp. 29 and 31; Pl., fig. 9 (♀). F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 238, 243, and 286 (♀ ♂).

Synagris amplissima A. MOCÁRY, Ann. Mus. nat. Hungarici, I, 1903, p. 506 (♀ ♂).

German East Africa, Nyasaland.—Type locality: Usambara."

7. **Synagris analis** H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 86; Pl. XIII, figs. 5 and 5a (♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 195; Pl. II, fig. 10 (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 37. DALLA TORRE, Cat., IX, Vesp., 1894, p. 34; Gen. Ins. Vesp., 1904, p. 30; Pl. III, fig. 7. C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), XII, 1903, pp. 47 and 68. F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 224, figs. 9 and 10; pp. 236, 240, and 253; p. 322, figs. 22–24; Pl. I, fig. 4; Pl. II, figs. 12–16 (♀ ♂).

Synagris abdominalis H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 157; Pl. VIII, fig. 7 (♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 202. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 37. DALLA TORRE, Cat., IX, Vesp., 1894, p. 34; Gen. Ins. Vesp., 1904, p. 30.

Synagris dubia H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 202; Pl. II, fig. 17 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 36; Gen. Ins. Vesp., 1904, p. 31.

Synagris intermedia P. CAMERON, Rec. Albany Mus., I, 4, 1905, p. 207 (♀ ♂).

Synagris heydeniana H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 194; Pl. II, fig. 9 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 36; Gen. Ins. Vesp., 1904, p. 31. A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 272. E. ZAVATTARI, Boll. Mus. Zool. Anat. comp. Torino, XXII, No. 555, 1907, p. 3.

Synagris tarsalis GERSTÆCKER, Arch. f. Naturg., XXXVII, 1, 1871, p. 350 (♀ ♂); in v. d. Decken's Reisen in Ost-Afrika, III, 2, Gliederth., 1873, p. 322. DALLA TORRE, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., pp. 29 and 30. A. v. SCHULTHESS, Wiss. Ergebn. D. Z. Afrik. Exp., (1907-08), IV, Lf. 10, 1912, p. 293.

Synagris xanthura H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 155 (♀); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 187. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 36. GERSTÆCKER, in Peters, Reise n. Mossambique, Zool., V, 1862, p. 464. GRIBODO, Ann. Mus. civ. Genova, XXI, 1884, p. 292; Mem. Ac. Sc. Bologna, (5), V, 2, 1895, Sc. nat., p. 95. MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 613; (2), XIX, 1898, pp. 33 and 594. DALLA TORRE, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31. A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 272. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., pp. 29 and 30. E. ZAVATTARI, Boll. Mus. Zool. Anat. comp. Torino, XXII, No. 548, 1907, p. 1; No. 550, 1907, p. 2. P. CAMERON, Ann. Transvaal Mus., II, 3, 1910, p. 160.

Eritrea, Abyssinia, Uganda, Eastern Belgian Congo, British and German East Africa, Zanzibar, North East Rhodesia, Nyasaland, Mozambique, Transvaal, Basutoland, Natal, Cape Colony, Kabinda (Chinchoxo).¹ (The occurrence of this species in Madagascar is extremely doubtful).— Type locality: l'Abyssinie."

7a. var. *nigroclypeata* F. MAIDL, Anzeiger Ak. Wiss. Wien, 1914, p. 97 (♀); Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 236 and 255 (♀ ♂).

German Southwest Africa.— Type locality: "Damaraland."

8. *Synagris calida* (LINNÉ) SERVILE, in Palisot de Beauvois, Insectes recueillis en Afrique et Amérique, 1805, p. 261; Atlas, Hymén., Pl. x, figs. 6 and 6a-b (♀ ♂). JURINE, Nouv. Méth. class. Hym., 1807, p. 169 (♀ ♂). LEPELETIER, Encycl. method. Insect., X, 1825, p. 509 (♀ ♂); Hist. nat. Ins. Hym., II, 1841, p. 594 (♀ ♂). GUÉRIN, Iconogr. Règne anim., II (Atlas), 1835, Pl. LXXII, fig. 3; III (Texte), Insect., 1844, p. 446; in Lefebvre, Voy. en Abyssinie, IV, Zool., pt. VI, 1848, p. 362. F. SMITH, Trans. Ent. Soc. London, (2), III, 1856, Proc., p. 128 (ethology); Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 35; Pl. VI, fig. 3. GUEINZIUS, Trans. Ent. Soc. London, (2), V, 1858, Proc., p. 9 (ethology). TASCHENBERG, Zeitschr.

¹ Chinchoxo is a locality near Landana in the Portuguese territory of Kabinda; not in Angola as stated by Maidl.

f. die ges. Naturw., XXXIX, 1872, pp. 1-5 (ethology). RADOSZKOWSKY, Hor. Soc. ent. Rossicæ, XII, 2, 1876, p. 145. DALLA TORRE, Cat., IX, Vesp., 1894, p. 35; Gen. Ins. Vesp., 1904, p. 30. FOX, Proc. Ac. Nat. Sc. Philadelphia, XLVIII, 1896, p. 554. CANNAVIELLO, Bull. Soc. ent. Italiana, XXXII, 1900, p. 296. P. CAMERON, Rec. Albany Mus., I, 4, 1905, p. 208; Ann. Transvaal Mus., II, 3, 1910, p. 160. F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 236, 240, and 265; Pl. III, figs. 29-34 (♀ ♂).

Synagris bellicosa H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 84 (♀ ♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 191; Pl. II, fig. 7. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 37. DALLA TORRE, Cat., IX, Vesp., 1894, p. 35; Gen. Ins. Vesp., 1904, p. 30. A. TULLGREN, Ark. f. Zool., I, 1904, p. 451.

Vespa calida LINNÉ, Syst. Nat., ed. 10a, I, 1758, p. 574; ed. 12a, I, 2, 1767, p. 952. FABRICIUS, Syst. Entom., 1775, p. 366; Spec. Insect., I, 1781, p. 462; Mantis. Ins., I, 1787, p. 289; Entom. System., II, 1793, p. 262; Syst. Piez., 1804, p. 259. PH. L. MÜLLER, in Linné, Vollst. Natursyst., V, 2, 1775, p. 887. GMELIN, in Linné, Syst. Nat., ed. 13a, I, 5, 1790, p. 2759. CHRIST, Naturg. d. Insekt., 1791, p. 225. OLIVIER, Encycl. method. Insect., VI, 1791, p. 683.

Vespa carbonaria DE GEER, Mém. Hist. Ins., VII, 1778, p. 609; Pl. XLV, fig. 9. GOEZE, in de Geer, Abh. Gesch. Insekt., VII, 1783, p. 217; Pl. XLV, fig. 9. RETZIUS, Caroli de Geer Gen. Spec. Ins., 1783, p. 241.

Synagris combusta H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 185; Pl. II, fig. 4 (♀). C. RITSEMA, Tijdschr. v. Entom., XVII, 1874, p. 200. GRIBODO, Ann. mus. civ. Genova, XXI, 1884, p. 291. DALLA TORRE, Cat., IX, Vesp., 1894, p. 35; Gen. Ins. Vesp., 1904, p. 30. A. v. SCHULTHESS, Deutsche entom. Zeitschr., 1914, p. 291.

Vespa crabro microrrhæa CHRIST, Naturg. d. Insekt., 1791, p. 218; Pl. XVIII, fig. 6.

Synagris mandibularis H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 184; Pl. II, fig. 3 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 36; Gen. Ins. Vesp., 1904, p. 31. A. v. SCHULTHESS, Wiss. Ergebn. D. Z. Afrik. Exp. (1907-08), IV, Lf. 10, 1912, p. 292.

Synagris sicheliana H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 183; Pl. II, figs. 1c and 1m (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 344. E. ROUBAUD, C. R. Ac. Sc. Paris, CXLVII, 1908, pp. 696-697 (ethology); Ann. Soc. ent. France, LXXIX, 1910, pp. 3-7; Pl. I, figs. 1 and 3; Pl. II (ethology); Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 3-16 (ethology). J. C. BRIDWELL, Proc. Hawaiian Ent. Soc., III, 4, (1916), 1917, p. 261. A. v. SCHULTHESS, Deutsche entom. Zeitschr., 1914, p. 291.

Synagris tetrameria H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 193 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31.

Senegal, Sierra Leone, Liberia, Gold Coast, Togo, Dahomey, Southern and Northern Nigeria, Cameroon, French Congo, Kabinda, Belgian Congo, Angola, Uganda, British and German East Africa, Cape Colony.—Type locality: "ad Cap. b. spei."

9. *Synagris crassipes* F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 338; Pl. xv, fig. 90; Pl. xvi, figs. 112 and 113 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 36; Gen. Ins. Vesp., 1904, p. 31. ED. ANDRÉ, Rev. d'Ent. Caen, XIV,

1895, p. 354 (♂). A. v. SCHULTHESS, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 343; Deutsche entom. Zeitschr., 1914, p. 291. R. DU BUYSSON, Rev. d'Ent. Caen, XXVIII, 1909, p. 178 (♀ ♂). F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 236, 240, and 281, fig. 19; Pl. iv, figs. 45 and 46 (♀ ♂).

Cameroon, Spanish Guinea, French Congo, Belgian Congo, Uganda.—Type locality: "Chutes de Samlia, Riv. N. Gamio."

10. **Synagris elephas** ED. ANDRÉ, Rev. d'Ent. Caen, XIV, 1895, p. 353 (♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 31. F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 239 and 261 (♂).

Sierra Leone.—Type locality: "Sierra Leone."

11. **Synagris fasciata** A. MOCÁRY, Ann. Mus. nat. Hungarici, I, 1903, p. 505 (♀ ♂). F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 238, 242, and 299; Pl. iv, fig. 52; Pl. v, fig. 53 (♀ ♂).

German East Africa.—Type locality: "Ukani."

12. **Synagris huberti** H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 156; Pl. VIII, figs. 8 and 8a (♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 189 (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 37. DALLA TORRE, Cat., IX, Vesp., 1894, p. 36; Gen. Ins. Vesp., 1904, p. 31. F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 222, fig. 1; pp. 238, 242, and 291; Pl. iv, figs. 49 and 50 (♀ ♂).

Synagris quadripunctata A. TULLGREN, Ark. f. Zool., I, 1904, p. 450; Pl. xxv, figs. 12a and 12b (♀).

Sierra Leone, Gold Coast, Togo, Cameroon, French Congo.—Type locality: "l'Afrique tropicale ou l'Arabie."

12a. var. **bimaculata** F. MAIDL, Anzeiger Ak. Wiss. Wien, 1914, p. 98 (♀); Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 238 and 294 (♀).

Eastern Belgian Congo, Uganda.—Type locality:?

12b. var. **clypeata** (A. MOCÁRY).

Synagris clypeata MOCÁRY, Ann. Mus. nat. Hungarici, I, 1903, p. 503 (♀). R. DU BUYSSON, Rev. d'Ent. Caen, XXVII, 1908, p. 213 (ethology) (♂). A. v. SCHULTHESS, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 343.

Synagris huberti var. *clypeata* F. MAIDL (*pro parte*), Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 237, 241, 242, and 289 (♀ ♂).

Togo, Cameroon, Spanish Guinea, French Congo, Belgian Congo.—Type locality: "Gabun."

12c. var. **nigricans** F. MAIDL, Anzeiger Ak. Wiss. Wien, 1914, p. 98 (♀ ♂); Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 238, 242, and 293 (♀ ♂).

Uganda.—Type locality:?

13. **Synagris kohli** F. MAIDL, Anzeiger Ak. Wiss. Wien, 1914, p. 98 (♀ ♂); Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 236, 240, and 259; Pl. II, figs. 19–23 (♀ ♂).

Togo, Cameroon, Spanish Guinea, Belgian Congo, Uganda, German East Africa.—Type locality: "Bismarckburg."

14. **Synagris maxillosa** H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 196; Pl. II, fig. 11 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 36; Gen. Ins. Vesp., 1904, p. 31. A. v. SCHULTHESS, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 343. F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 236, 240, and 257; Pl. II, figs. 17 and 18 (♀ ♂).

Senegal, Cameroon, Belgian Congo, Cape Colony.— Type locality: "Sénégal."

15. *Synagris mirabilis* GUÉRIN, in Lefebvre, Voy. en Abyssinie, IV, Zool., pt. VI, 1848, p. 359; Atlas, Pl. VIII, fig. 8 (♂). REICHE et FAIRMAIRE, in Ferret et Galinier, Voy. en Abyssinie, III, 1849, p. 453; Atlas, Zool., Pl. XXIX, fig. 11. H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 82 (♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 181 (♂). F. SMITH, Trans. Ent. Soc. London, (2), III, 1856, Proc., p. 128 (ethology); Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 36; Pl. VI, fig. 2. W. L. DISTANT, A Naturalist in the Transvaal, 1892, p. 210. DALLA TORRE, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., pp. 29, 30, and 31 (♀ ♂). A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 272. CANNAVIELLO, Bull. soc. ent. Italiana, XXXII, 1900, p. 297. C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), XII, 1903, pp. 47 and 68. P. CAMERON, Ann. Transvaal Mus., II, 3, 1910, p. 160. F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw., Kl., XCI, 1914, p. 224, figs. 11 and 12; pp. 238, 242, and 278; Pl. IV, figs. 43 and 44 (♀ ♂).

Synagris stuhlmanni H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., pp. 30 and 32 (♂). A. MOCŠÁRY, Ann. Mus. nat. Hungarici, I, 1903, p. 508 (♀ ♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 31.

Eritrea, Abyssinia, Uganda, German East Africa, Zanzibar, North East Rhodesia, Nyasaland, Mozambique, Transvaal, Natal.— Type locality: "Abyssinie."

16. *Synagris negusi* R. DU BUYSSON, Rev. d'Ent. Caen, XXV, 1906, p. 107 (♀ ♂). F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 224, figs. 7 and 8; pp. 236, 239, and 271; Pl. IV, figs. 38–40 (♀ ♂).

Eastern Belgian Congo, Uganda, British and German East Africa, Mozambique.— Type locality: "Naivasha."

17. *Synagris ornatissima* F. MAIDL, Anzeiger Ak. Wiss. Wien, 1914, p. 98 (♀); Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 238 and 297; Pl. IV, fig. 51 (♀).

Eastern Belgian Congo.— Type locality: "Urwald Mawambi."

18. *Synagris rufopicta* A. TULLGREN, Ark. f. Zool., I, 1904, p. 448; Pl. XXIV, figs. 10a and 10b (♀).

Synagris imitator R. DU BUYSSON, Rev. d'Ent. Caen, XXVII, 1909, p. 213 (♀).

Synagris huberti var. *clypeata* F. MAIDL (*pro parte*), Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 237, 241, 242, and 289 (♀).

Cameroon, Spanish Guinea (San Benito River), Belgian Congo.— Type locality: "Kitta."

I was unable to find the original description of *Rhynchium imitator* P. Cameron, 1909, which according to G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XIV, 1914, p. 405, is a *Synagris*.

18a. var. *mimetica* J. BEQUAERT. See p. 226 (♀).

Belgian Congo.— Type locality: Medje.

19. *Synagris spiniventris* (ILLIGER) F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 236, 240, and 261; Pl. II, fig. 24; Pl. III, figs. 25–28 (♀ ♂).

Vespa spiniventris ILLIGER, Magaz. f. Insektenk., I, 1802, p. 190 (♂, described as a ♀).

Synagris æquatorialis H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 81; Pl. XIII, fig. 4 (♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, pp. 183 and 198; Pl. II, fig. 2 (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 36. DALLA TORRE, Cat., IX, Vesp., 1894, p. 34; Gen. Ins. Vesp., 1904, p. 30.

Synagris affinis H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 186; Pl. II, fig. 5 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 34; Gen. Ins. Vesp., 1904, p. 30. F. KOHL, Jahrb. Hamburg. wiss. Anst., X, 2, (1892), 1893, p. 189. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 32.

Synagris calida REICHE et FAIRMAIRE, in Ferret et Galinier, Voy. en Abyssinie, III, 1849, p. 452; Atlas, Zool., Pl. XXIX, figs. 7 and 8 (♂). H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 79; Pl. v, figs. 2a and 2b; Pl. XIII, figs. 2 and 2 a-c (♀ ♂); III, Suppl., 1854, p. 155; Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 181 (♂). MAIDRON, Quelques mots sur les Guêpes maçonnes, St. Louis, Sénégal, 1879 (Moniteur du Sénégal et Dépendances, 15 avril 1879) (ethology). E. ROUBAUD, C. R. Ac. Sc. Paris, CXLVII, 1908, p. 695 (ethology); Ann. Soc. ent. France, LXXIX, 1910, pp. 2-3; Pl. I, figs. 2 and 4; Pl. IV, figs. 4 and 5 (ethology); Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 3-16 (ethology).

Synagris capitata H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 189 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 35; Gen. Ins. Vesp., 1904, p. 30.

Synagris dentata H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 80; Pl. XIII, figs. 3 and 3a (♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 197; Pl. II, figs. 12c and 12m (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 35. RADOSZKOWSKY, Journ. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 203. DALLA TORRE, Cat., IX, Vesp., 1894, p. 36; Gen. Ins. Vesp., 1904, p. 31. C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), XII, 1903, p. 68.

Synagris ferox H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 201 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 36; Gen. Ins. Vesp., 1904, p. 31.

Synagris xanthura P. CAMERON (*pro parte*), Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 183 (see A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 14).

Senegal, Gambia, Bissao, Sierra Leone, Gold Coast, Togo, Dahomey, Southern Nigeria, Northern Nigeria, Cameroon, French Congo, Belgian Congo, Uganda, British East Africa.—Type locality: "Sierra Leone."

20. *Synagris spinosuscula* H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 85; Pl. XIII, figs. 6 and 6a (♀ ♂); Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 189; Pl. II, figs. 6c and 6m (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 37. DALLA TORRE, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31. F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 224, fig. 4; pp. 236, 240, and 269; Pl. III, figs. 35-37 (♀ ♂).

Synagris ruppelliana H. DE SAUSSURE, Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 201; Pl. II, fig. 16 (♀). GRIBODO, Ann. Mus. civ. Genova, XVI, 1881, p. 240. DALLA TORRE, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31.

Abyssinia, Eritrea, British East Africa.—Type locality: "l'Abyssinie."

Subgenus 4. *Synagris* LATREILLE, *sensu stricto*

Type: *Vespa cornuta* Linné, 1758.

21. *Synagris cornuta* (LINNÉ) LATREILLE, Hist. nat. Crust. Ins., III, 1802, p. 360; XIII, 1805, p. 344 (♀ ♂); Gen. Crust. et Ins., IV, 1809, p. 135 (♂). KLUG, Magaz. Ges. naturf. Fr. Berlin, II, 1808, p. 51. LAMARCK, Hist. nat. Anim. s. vert., IV, 1817, p. 82; *ibid.*, ed. 2a, II, 1835, p. 299. GRIFFITH and PIDGEON, in Cuvier,

The Class Insecta, II, 1832, p. 575; Pl. cvi, fig. 18; Pl. cvii, fig. 1 (♂). WESTWOOD, in Drury, Illustr. Nat. Hist., ed. 2a, IV, 1837, p. 98; Pl. XLVIII, fig. 3. LEPELETIER, Encycl. méthod. Ins., X, 1825, p. 510 (♀ ♂); Hist. nat. Ins. Hym., II, 1841, p. 593 (♀ ♂). BLANCHARD, Hist. nat. des Insectes, 1840, p. 389. H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 82; Pl. xiii, fig. 1 (♀ ♂); iii, Suppl., 1854, p. 155; Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 180. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 36.—RADOSZKOWSKY, Journ. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 203. A. SCHLETTERER, Ann. Soc. entom. Belgique, XXXV, 1891, p. 19. DALLA TORRE, Cat., IX, Vesp., 1894, p. 35; Gen. Ins. Vesp., 1904, p. 31; Pl. iii, fig. 6. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 344; Pl. xvi, fig. 111. Ed. ANDRÉ, Rev. d'Ent. Caen, XIV, 1895, p. 352 (ethology). C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), XII, 1903, p. 46. A. TULLGREN, Ark. f. Zool., I, 1904, p. 446. E. ROUBAUD, C. R. Ac. Sc. Paris, CXLVII, 1908, p. 696 (ethology); Ann. Soc. ent. France, LXXIX, 1910, pp. 7–16; Pl. iii, figs. 1–4; Pl. iv, fig. 1 (ethology); Annual Rept. Smithsonian Inst. Washington for 1910, 1911, pp. 513–521 (ethology). A. v. SCHULTHESS, Wiss. Ergebn. D. Z. Afrik. Exp. (1907–08), IV, Lf. 10, 1912, p. 292; Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 343; Deutsche entom. Zeitschr., 1914, p. 291. W. A. SCHULZ, Berlin. ent. Zeitschr., LVII, 1912, p. 57. F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 222, fig. 2; p. 224, fig. 5; p. 225, figs. 13 and 14; p. 227, figs. 15 and 16; pp. 237, 241, and 301; p. 282, fig. 19; Pl. i, figs. 5–8; Pl. v, figs. 54–56 (♀ ♂). J. C. BRIDWELL, Proc. Hawaiian Ent. Soc., III, 4, (1916), 1917, p. 261 (ethology).

Vespa cornuta LINNÉ, Syst. Nat., ed. 12a, I, 1758, p. 574 (♀ ♂); Mus. Ludov. Ulric., 1764, p. 409 (♀ ♂); Syst. Nat., ed. 12a, I, 2, 1767, p. 951 (♀ ♂). FABRICIUS, Syst. Entom., 1775, p. 363; Spec. Insect., I, 1781, p. 459 (♀ ♂); Mant. Insect., I, 1787, p. 287; Entom. Syst., II, 1793, p. 255 (♀ ♂); Syst. Piez., 1804, p. 252 (♀ ♂). PH. L. MÜLLER, in Linné, Vollst. Natursyst., V, 2, 1775, p. 885 (♀ ♂). GMELIN, in Linné, Syst. Nat., ed. 13a, I, 5, 1790, p. 2758 (♀ ♂). OLIVIER, Encycl. méthod. Insect., VI, 1791, p. 678. JURINE, Nouv. Méth. classer Hym., 1807, p. 169 (♀ ♂).

Apis cornuta DRURY, Illustr. Nat. Hist., II, 1773, p. 88; Pl. XLVIII, fig. 3 (♂).

Vespa crabro cornuta CHRIST, Naturg. der Insekt., 1791, p. 214; Pl. XVIII, fig. 2 (♀ ♂).

Synagris sericea SPINOLA, Insect. Ligur., II, 1808, p. 188, footnote (♀). H. DE SAUSSURE, Et. fam. Vesp., III, Suppl., 1854, p. 159; Mém. Soc. Phys. Hist. nat. Genève, XVII, 1863, p. 204. DALLA TORRE, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31.

Sierra Leone, Gold Coast, Liberia, Grand Bassam, Togo, Côte d'Ivoire, Fernando Po, Cameroon, Spanish Guinea, French Congo, Belgian Congo, Kabinda, Angola, German East Africa. Its occurrence in South Africa is very doubtful.—Type locality: "in Indiis."

21a. var. *basalis* (MOCSÁRY) F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 238, 242, and 305 (♀ ♂).

Synagris basalis A. MOCSÁRY, Ann. Mus. nat. Hungarici, IV, 1906, p. 198 (♀).

Synagris cornuta var. *ugandæ* G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 46 (♀ ♂).

Uganda, eastern Belgian Congo, British East Africa.—Type locality: "Uganda."

21b. var. *didieri* (R. DU BUYSSON) F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 238, 242, and 304 (♀ ♂).

Synagris didieri R. DU BUYSSON, Rev. d'Ent. Caen, XVII, 1908, p. 214 (♀ ♂) (ethology).

Belgian Congo.— Type locality: “rive gauche du Congo, en aval du confluent de l'Irebou.”

21c. var. **flavofasciata** J. BEQUAERT. See p. 210 (♀ ♂).

Belgian Congo.— Type locality: Medje.

21d. var. **ituriensis** J. BEQUAERT. See p. 209 (♀ ♂).

Belgian Congo.— Type locality: Risimu (Batama).

21e. var. **maculata** J. BEQUAERT. See p. 210 (♀).

Belgian Congo.— Type locality: Medje.

21f. var. **rufithorax** J. BEQUAERT. See p. 208 (♀).

Belgian Congo.— Type locality: Malela.

21g. var. **similis** J. BEQUAERT. See p. 210 (♀ ♂).

Belgian Congo.— Type locality: Medje.

22. **Synagris fulva** A. MOCŠÁRY, Ann. Mus. nat. Hungarici, I, 1903, p. 503 (♀). F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, p. 224, fig. 6; pp. 236, 240, and 312; Pl. v, figs. 62–64 (♀ ♂).

German East Africa.— Type locality: “Ukami.”

22a. var. **trispinosa** (A. TULLGREN) F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 237, 241, and 312 (♀ ♂).

Synagris trispinosa A. TULLGREN, Ark. f. Zool., I, 1904, p. 447; Pl. xxiv, figs. 9 a–e (♀ ♂). R. DU BUYSSON, Rev. d'Ent. Caen, XXVIII, 1909, p. 178 (♂).

Cameroon.— Type locality: “Kitta.”

23. **Synagris proserpina** GRIBODO, Bull. Soc. ent. Italiana, XXIII, 1891, p. 265 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 37; Gen. Ins. Vesp., 1904, p. 31. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., pp. 29 and 30 (♀ ♂). F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 237, 241, and 309; Pl. v, figs. 59–61 (♀ ♂).

German East Africa, Zanzibar.— Type locality: “Bagamojo.”

23a. var. **nyassæ** (H. STADELMANN).

Synagris nyassæ H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 30; Pl., fig. 10 (♂). A. MOCŠÁRY, Ann. Mus. nat. Hungarici, I, 1903, p. 507 (♀).

Synagris niassæ H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 31 (♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 31.

Synagris flavomaculata G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), VIII, 1911, p. 454 (♀ ♂).

Synagris proserpina var. *niassæ* F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw., Kl., XCI, 1914, pp. 237, 241, and 310 (♀ ♂).

German East Africa, Nyasaland, North East Rhodesia, southeastern Belgian Congo (Katanga).— Type locality: “Nyassa-See.”

24. **Synagris similis** F. MAIDL, Anzeiger Ak. Wiss. Wien, 1914, p. 98 (♀ ♂); Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 237, 240, and 308; Pl. v, figs. 57 and 58 (♀ ♂).

Eastern Belgian Congo, German East Africa.— Type locality: “Urwald Beni und Moera.”

24a. var. **maculata** F. MAIDL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., XCI, 1914, pp. 238, 242, and 308 (♀ ♂).

Eastern Belgian Congo.— Type locality: “Urwald Beni und Moera.”

These are probably only color variations of *S. cornuta*, and the same as *S. cornuta* var. *similis* J. Bequaert and *S. cornuta* var. *maculata* J. Bequaert.

23. **Rhynchalastor** G. MEADE WALDO

Ann. Mag. Nat. Hist., (8), VI, 1910, p. 110.

Genotype: *Rhynchalastor fuscipennis* G. Meade Waldo.

1. **Rhynchalastor fuscipennis** G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), VI, 1910, p. 110 (♀); Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 501.

Stenodynerus ferrugineus var. *mafiensis* A. v. SCHULTHESS, Soc. entomol., XXIX, 1914, p. 73 (♀ ♂).

German East Africa, Delagoa Bay.—Type locality: "German East Africa."

2. **Rhynchalastor xanthosoma** (A. SCHLETTERER) G. MEADE WALDO, Trans. Ent. Soc. London, (1914), pt. 3-4, 1915, p. 501.

Odynerus xanthosoma A. SCHLETTERER, Ann. Soc. ent. Belgique, XXXV, 1891, p. 24; Pl. I, fig. 10 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 105; Gen. Ins. Vesp., 1904, p. 57.

Belgian Congo.—Type locality: "Equateur-Congo."

24. **Alastor** LEPELETIER

Hist. nat. Ins. Hym., II, 1841, p. 668.

Genotype: *Alastor atropos* Lepeletier, 1841.

1. **Alastor braunsi** G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 47 (♀ ♂).

Cape Colony.—Type locality: "Willowmore."

2. **Alastor bucida** H. DE SAUSSURE, Et. fam. Vesp., I, Eum., 1852, p. 257 (♀); III, Suppl., 1854, p. 328; Entom. Zeitg. Stettin, XXIII, 1862, p. 206. DALLA TORRE, Cat., IX, Vesp., 1894, p. 110; Gen. Ins. Vesp., 1904, p. 60.

Alastor lucida F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 89.

Cape Colony.—Type locality: "le Cap de Bonne-Espérance."

3. **Alastor promontorii** G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 48 (♀ ♂).

Cape Colony.—Type locality: "Willowmore."

4. **Alastor schinzii** A. v. SCHULTHESS, Soc. entomol., XXVIII, 1913, p. 7, fig. (♂).

German Southwest Africa.—Type locality: "Ambola."

EPIPONINÆ

25. **Belonogaster** H. DE SAUSSURE

Et. fam. Vesp., II, Vesp., 1853, p. 235.

Raphigaster H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 12 (*nec* LEPELETIER, 1841).

Genotype: *Vespa juncea* Fabricius, 1781.

1. **Belonogaster abyssinicus** R. DU BUYSSON, Bull. Soc. ent. France, 1906, p. 190 (♀ ♂); Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 214, 223, and 263;

Pl. iv, fig. 4; Pl. v, fig. 6 (♀ ♂) (ethology). A. v. SCHULTHESS, Soc. entomol., XXVII, 1912, p. 41; Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 338.

Raphigaster junceus var. H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, Pl. II, fig. 2.

Abyssinia, Eritrea.—Type locality: "Abyssinie."

2. ***Belonogaster apicalis*** H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 207 and 208 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 80. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 214 and 230 (♀) (ethology).

Belonogaster malagassus var. H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 210.

Madagascar, Nossi Bé.—Type locality: "Madagascar."

3. ***Belonogaster atratus*** A. v. SCHULTHESS, Soc. entomol., XXVII, 1912, p. 41 (♀); Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 337, fig. 1 (♀).

Cameroon.—Type locality: "Uelleburg."

4. ***Belonogaster brachystomus*** F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 322, 326, and 334; Pl. xv, fig. 78; Pl. xvii, fig. 136 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 217, 219, 252, and 265 (♀ ♂).

German East Africa, Congo, Mozambique.—Type locality: "Delagoa Bay."

5. ***Belonogaster brevipetiolatus*** H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 89 and 98; Pl. iv, fig. 1 (♀ ♂); Abh. Senckenberg. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 207. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 321, 323, and 334; Pl. xv, fig. 83; Pl. xvi, figs. 95, 99, and 120 (♀ ♂). R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 214, 227, and 263; Pl. vi, fig. 1 (♀ ♂) (ethology). DALLA TORRE, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80.

Madagascar, Nossi Bé.—Type locality: "Fianarantsoa (pays des Betsileo)."

6. ***Belonogaster brunneus*** C. RITSEMA, Tijdschr. v. Entom., XVII, 1874, p. 202 (♀). F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 334. DALLA TORRE, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 217, 219, 245, and 264; Pl. vi, fig. 2 (♀ ♂) (ethology); Voy. Alluaud et Jeannel Afr. or., Rés. sc., Ins. Hym., III, Vesp., 1914, p. 162. W. A. SCHULZ, Spolia Hymenopterologica, 1906, p. 226.

Belonogaster distinguendus F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 322, 323, 328, and 335; Pl. xv, figs. 79 and 94; Pl. xvi, fig. 98; Pl. xvii, fig. 141 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80. W. A. SCHULZ, Hymenopt. Studien, 1905, p. 15.

Senegal, Liberia, Grand Bassam, Fernando Po, Togo, Cameroon, Gaboon, French Congo, Belgian Congo, German East Africa, Uganda.—Dalla Torre records this species by mistake from New Guinea.—Type locality: "Banana-Loango."

7. ***Belonogaster buyssoni*** G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), VII, 1911, p. 99 (♀).

Southern Nigeria.—Type locality: "Iganga Busoga."

Probably a synonym of *B. pusillus* Kohl.

8. ***Belonogaster clypeatus*** F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 321, 328, and 335; Pl. xv, figs. 88 and 91; Pl. xvii, figs. 124, 144, and 149 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 35. A. v. SCHULTHESS,

Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 269. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 217, 219, 244, and 264; Pl. II, figs. 9 and 10; Pl. V, figs. 1-2 (♀ ♂) (ethology); Voy. Alluaud et Jeannel Afr. or., Rés. sc., Ins. Hym., III, Vesp., 1914, p. 162.

German and British East Africa, Zanzibar, Mozambique, Transvaal, Cape Colony.— Type locality: "Deutsch-Mozambique."

9. **Belonogaster dubius** F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 322, 323, 329, and 335; Pl. xv, fig. 80; Pl. xvi, fig. 100; Pl. xvii, fig. 145 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 35. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 215, 219, 235, and 263 (♀ ♂) (ethology); Voy. Alluaud et Jeannel Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 161. E. ROUBAUD, C. R. Ac. Sc. Paris, CLI, 1910, pp. 553-556 (ethology); Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 110-139 (ethology). A. v. SCHULTHESS, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 338.

Belonogaster sævus var. H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 92, in footnote (♀).

Belonogaster massaicus P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 171 (♀). Synonym according to A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 14.

Casamance, Sierra Leone, Portuguese Guinea, Côte d'Ivoire, Fernando Po, Cameroon, French Congo, Portuguese Congo, Belgian Congo, Uganda, British and German East Africa, Zanzibar, Mozambique, Natal.— Type locality: "Dar es Salaam."

10. **Belonogaster eumenoides** H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 89 and 94; Pl. xvii, fig. 12 (♀); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 207 and 209. DALLA TORRE, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 215, 234, and 263; Pl. IV, fig. 6 (♀ ♂) (ethology). F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 335.

Belonogaster pomicolor H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 207 and 209 (♀ ♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 80.

Belonogaster ornatus H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 207 and 209 (♀ ♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 80.

Madagascar, Nossi Bé.— Type locality: "Andrangoloaka."

11. **Belonogaster facialis** R. DU BUYSSON, Bull. Soc. ent. France, 1908, p. 65 (♀); Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 215 and 238 (♀); Voy. Alluaud et Jeannel Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 161.

Belonogaster sex-maculatus P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 174 (♂). Synonym according to A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 14.

Senegal, Congo, East Africa, Zanzibar.— Type locality: "Sénégal."

12. **Belonogaster filiformis** (H. DE SAUSSURE) F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 335. DALLA TORRE, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 216, 217, and 257 (♀).

Raphigaster filiformis H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 18; Pl. II, fig. 4 (♀).

Southern Arabia.—Type locality: "Djidda."

Perhaps a variety of *B. griseus* (Fabricius).

13. ***Belonogaster filiventris*** (H. DE SAUSSURE) F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 94. DALLA TORRE, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 335. C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), XII, 1903, pp. 47 and 68. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 216, 218, 241, and 264; Pl. iv, fig. 1; Pl. vi, fig. 3 (♀ ♂) (ethology); Voy. Alluaud et Jeannel Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 162.

Raphigaster filiventris H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 16; Pl. II, fig. 5 (♀).

Belonogaster braunsii F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 323, 331, and 334 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80.

Belonogaster kohli W. A. SCHULZ, Spolia Hymenopterologica, 1906, p. 322 (♀).

Belonogaster gracilis P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 173 (♀). Synonym according to A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 14.

Sierra Leone, Togo, Cameroon, Fernando Po, French Congo, Belgian Congo, German and British East Africa, Mozambique, Nyasaland, Transvaal, Natal.—Type locality: H. de Saussure (1853) gives: "le Sénégal." The type specimen is labeled "Cayenne," according to R. du Buysson (1909).

14. ***Belonogaster freyi*** R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 217 and 255 (♀).

South Africa.—Type locality: "Afrique australe."

15. ***Belonogaster griseus*** (FABRICIUS) F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 94. DALLA TORRE, Cat., IX, Vesp., 1894, p. 115; Gen. Ins. Vesp., 1904, p. 80. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 335. RADOSZKOWSKY, Journ. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 203. MAGRETTI, Ann. Mus. civ. Genova, (2), XIX, 1898, p. 37. C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), XII, 1903, p. 47. A. v. SCHULTHESS, Reise in Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 64; Wiss. Ergebn. D. Z. Afrik. Exp., (1907-08), IV, Lf. 10, 1912, p. 291; Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 339; Deutsche entom. Zeitschr., 1914, p. 288. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 217, 218, 247, and 264; Pl. II, figs. 11-12; Pl. IV, fig. 8; Pl. V, fig. 3 (♀ ♂) (ethology); Voy. Alluaud et Jeannel Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 162. P. CAMERON, Ann. Transvaal Mus., II, 3, 1910, p. 155. E. ROUBAUD, C. R. Ac. Sc. Paris, CLI, 1910, pp. 553-556 (ethology); Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 110-139 (ethology).

Vespa grisea FABRICIUS, Syst. Entom., 1775, p. 372; Mantis. Ins., I, 1787, p. 293. OLIVIER, Encycl. method. Ins., VI, 1791, p. 672.

Vespa macilentus FABRICIUS, Species Insect., I, 1781, p. 468; Mantis. Ins., I, 1787, p. 293. OLIVIER, Encycl. method. Ins., VI, 1791, p. 673.

Belonogaster macilentus F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 94.

Vespa linearis OLIVIER, Encycl. method. Ins., VI, 1791, p. 673.

Belonogaster linearis F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 336. DALLA TORRE, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80.

Raphigaster rufipennis H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 15; Pl. II, fig. 6 (♀).

Belonogaster rufipennis F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 93. RADOSZKOWSKY, Hor. Soc. ent. Rossicæ, XII, 2, 1876, p. 141; Journ. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 203. Fox, Ent. News, II, 1891, p. 42. A. SCHLETTERER, Ann. Soc. ent. Belgique, XXXV, 1891, p. 28. W. L. DISTANT, A Naturalist in the Transvaal, 1892, p. 210. GRIBODO, Mem. Ac. Sc. Bologna, (5), IV, 1894, Sc. nat., p. 57. R. DU BUYSSON, Ann. Soc. ent. France, LXVI, 2-3, 1898, p. 362. (*nec Spheer rufipennis* DE GEER).

Belonogaster pictus F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 320, 323, 324, and 337; Pl. xvi, fig. 118; Pl. xvii, figs. 142, 146, 152, and 156 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. TULLGREEN, Ark. f. Zool., I, 1904, p. 454. P. CAMERON, Trans. South African Philos. Soc., XVI, pt. 4, 1906, p. 327. W. A. SCHULZ, Spolia Hymenopterologica, 1906, p. 321. F. MAIDL, Sitz. Ber. k. Ak. Wiss. Wien, math. naturw. Kl., CXXII, Heft 4, 1913, Abt. 1, p. 560. E. ZAVATTARI, Il Ruwenzori, Parte Scientif., I, Zool., 1909, p. 211.¹

Belonogaster erythrospilus P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 172 (♀ ♂). Synonym according to A. v. SCHULTHESS, Ark. f. Zool., VIII, No. 17, 1913, p. 14.

Belonogaster fulvipennis H. DE SAUSSURE (misprint for *rufipennis*), in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 87 in footnote, and 90. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 335.

Widely distributed throughout the Ethiopian part of the African continent, from the Cape Verde and Senegal to the Cape Colony; in Mt. Ruwenzori and Mt. Kilimanjaro up to 1500 m.—Type locality: "Sierra Leon, Africa."

15a. var. **fuscipennis** R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 251 and 264 (♀ ♂) (ethology).

Cameroon, French Congo, Mozambique, Transvaal, German and British East Africa.—Type locality: "Haute Sanga."

15b. var. **menelikii** (GRIBODO) R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 250 and 265; Pl. vii, fig. 1 (♀ ♂) (ethology); Voy. Alluaud et Jeannel Afr. or. Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 163.

Belonogaster menelikii GRIBODO, Ann. Mus. civ. Genova, (1), XIV, 1879, p. 342 (♀); XVI, 1881, p. 288 (♀ ♂); XX, 1884, p. 384 (♀); XXI, 1884, p. 288 (♀ ♂). F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 320, 323, and 337; Pl. xv, figs. 81 and 92; Pl. xvii, fig. 135 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. Fox, Proc. Ac. Nat. Sc. Philadelphia, XLVIII, 1896, p. 555. W. A. SCHULZ, Zoolog. Ann. Würzburg, IV, 1911, p. 200.

Throughout the eastern part of the African continent from Abyssinia to Natal; occurs also in Southern Arabia.—Type locality: "Mahal-Uonz," Seioa.

15c. var. **pallens** R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 216, 250, and 265 (♀ ♂) (ethology).

Widely distributed in West and East Africa.—Type locality: "Dakar."

16. **Belonogaster guerini** (H. DE SAUSSURE) F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 94. H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 89 and 91 (♀ ♂); Abh. Senckenb. naturf. Ges. Frankfurt

¹ H. de Saussure quotes in his synopsis of the Malagasy species of *Belonogaster*, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 207, a *B. pictus* which was apparently never described, but is very different from *B. pictus* Kohl.

a. M., XXVI, 2, 1900, pp. 207 and 208. DALLA TORRE, Cat., IX, Vesp., 1894, p. 115; Gen. Ins. Vesp., 1904, p. 80. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 335. A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 269; Reise Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 63. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 214 and 225; Pl. v, figs. 8-14 (♀ ♂) (ethology).

Raphigaster guerini H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 17; Pl. II, fig. 3 (♀).

Madagascar, Comoro Islands, (Pemba Island, Delagoa Bay?) (Abyssinia and Natal, according to de Saussure; Sierra Leone, according to Smith).—Type locality: "Madagascar."

17. ***Belonogaster hildebrandti*** H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 89 and 95; Pl. XVII, fig. 11 (♀ ♂); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 207 and 210. DALLA TORRE, Cat., IX, Vesp., 1894, p. 115; Gen. Ins. Vesp., 1904, p. 80. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 335. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 214 and 232; Pl. IV, fig. 5; Pl. V, figs. 5 and 7 (♀ ♂) (ethology).

Madagascar.—Type locality: "Madagascar, région centrale."

18. ***Belonogaster indicus*** (H. DE SAUSSURE) F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 94. H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 87. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 335. DALLA TORRE, Cat., IX, Vesp., 1894, p. 115; Gen. Ins. Vesp., 1904, p. 80. C. T. BINGHAM, Fauna Brit. India, Hym., I, 1897, p. 382, fig. 114 (♀ ♂). R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 214 and 258 (♀).

Raphigaster indicus H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 17 (♀).

British India (H. de Saussure, F. Smith, Bingham); Judaea, Japan (according to R. du Buysson); South Africa (H. de Saussure).—Type locality: "Judée," according to R. du Buysson; "Les Indes Orientales, Bombay," according to H. de Saussure.

18a. var. ***claripennis*** R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 217, 219, and 259, Pl. IV, fig. 9 (♀ ♂).

Uganda, German East Africa.—Type locality: "Kigonsera."

19. ***Belonogaster juncus*** (FABRICIUS) F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 93. GERSTÆCKER, in Peters, Reise n. Mossambique, Zool., V, 1862, p. 468; Arch. f. Naturg., XXXVII, 1, 1871, p. 351; in v. d. Decken's Reisen in Ost-Afrika, III, 2, Gliederth., 1873, p. 324. C. RITSEMA, Tijdschr. v. Entom., XVII, 1874, pp. 201 and 210. WALKER, List Hym. Egypt, 1871, p. 39. MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 599 (ethology); (2), XIX, 1898, p. 36. GRIBODO, Ann. Mus. civ. Genova, XXI, 1884, p. 289; Mem. Ac. Sc. Bologna, (5), V, 2, 1895, Sc. nat., p. 88. A. SCHLETTERER, Ann. Soc. ent. Belgique, XXXV, 1891, p. 28. F. KOHL, Jahrb. Hamburg. wiss. Anst., X, 2, (1892), 1893, p. 186; Ann. naturh. Hofmus. Wien, IX, 1894, p. 336. DALLA TORRE, Cat., IX, Vesp., 1894, p. 115; Gen. Ins. Vesp., 1904, p. 80; Pl. V, fig. 6. A. v. SCHULTHESS, Entom. Nachr., XIX, 1893, p. 18; Wiss. Ergebn. D. Z. Afrik. Exp., (1907-08), IV, Lf. 10, 1912, p. 291; Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 337; Soc. entomol., XXVII, 1912, p. 41; Ark. f. Zool., VIII, No. 17, 1913, p. 14; Deutsche entom. Zeitschr., 1914, p. 288. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 35. C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), XII, 1903, p. 48; Trans. Zool. Soc. London, XIX, 1909, 2, p. 181. R. DU BUYSSON, in A. Chevalier, L'Afrique centrale française, 1908, p.

707; Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 213, 220, and 263; Pl. II, figs. 1-7; Pl. III, figs. 1-7; Pl. IV, figs. 3 and 12-13; Pl. V, fig. 4; Pl. VII, fig. 2 (♀ ♂) (ethology); Voy. Alluaud et Jeannel Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 160. P. CAMERON, Ann. Transvaal Mus., II, 3, 1910, p. 156; Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 171. W. A. SCHULZ, Zoolog. Ann. Würzburg, IV, 1911, p. 200. A. TULLGREN, Ark. f. Zool., I, 1904, p. 453 (ethology). F. MAIDL, Sitz. ber. k. Ak. Wiss. Wien, math. naturw. Kl., CXXII, Abt. I, Heft 4, 1913, p. 560. E. ROUBAUD, C. R. Ac. Sc. Paris, CLI, 1910, pp. 553-556 (ethology); Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 110-139 (ethology).

Vespa juncea FABRICIUS, Spec. Insect., I, 1781, p. 468; Mant. Ins., I, 1787, p. 293. OLIVIER, Encycl. méthod. Ins., VI, 1791, p. 673.

Raphigaster junceus H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 14 (♀ ♂), with the exception of the figure.

Vespa cinerea FABRICIUS, Entom. System., II, 1793, p. 277.

Belonogaster colonialis F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 320, 323, and 335; Pl. xv, figs. 72 and 84; Pl. xvii, figs. 132 and 139 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80. Fox, Proc. Ac. Nat. Sc. Philadelphia, XLVIII, 1896, p. 555. C. T. BINGHAM, Trans. Zool. Soc. London, XIX, pt. 2, 1909, p. 181. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 35. E. ZAVATTARI, Il Ruwenzori, Parte Scientif., I, Zool., 1909, p. 210.

Raphigaster guineensis F. SMITH, Trans. Ent. Soc. London, (2), III, 1856, Proc., p. 129 (ethology).

Throughout the Ethiopian part of the African continent, from 20° lat. N. to Delagoa Bay and Natal; in Mt. Ruwenzori up to 2000 m.—Type locality: "in Africa æquinoctiali."

20. ***Belonogaster lateritius*** GERSTÆCKER, Monatsb. k. Preuss. Ak. Wiss. Berlin, 1857, p. 463 (♀); in Peters, Reise n. Mossambique, Zool., V, 1862, p. 468; Pl. xxx, fig. 7. F. KOHL, Jahrb. Hamburg. wiss. Anst., X, 2, (1892), 1893, p. 186; Ann. naturh. Hofmus. Wien, IX, 1894, p. 336. DALLA TORRE, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 216, 218, 256, and 264 (♀ ♂) (ethology); Résultats scientif. Voy. Afrique d'Ed. Foá, 1908, p. 593.

Eritrea, German East Africa, Mozambique, Angola, Damaraland, Transvaal, Natal, Caffraria, Belgian Congo.—Type locality: "Mossambique."

20a. var. ***agilis*** (F. KOHL) R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, p. 257.

Belonogaster agilis F. KOHL, Jahrb. Hamburg. wiss. Anst., X, 2, (1892), 1893, p. 187, footnote; Pl., figs. 1, 4, and 9-10 (♀ ♂); Ann. naturh. Hofmus. Wien, IX, 1894, pp. 321, 323, 327, and 334; Pl. xv, fig. 73; Pl. xvi, figs. 96 and 115; Pl. xvii, figs. 134, 151, and 155 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80.

Belonogaster fleckii F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 322, 332, and 335 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 115; Gen. Ins. Vesp., 1904, p. 80.

Angola, Damaraland.—Type locality: "Angola."

20b. var. ***elegans*** (GERSTÆCKER) R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 257 and 264.

Belonogaster elegans GERSTÆCKER, Monatsb. k. Ak. Wiss. Berlin, 1857, p. 463 (♀); in Peters, Reise n. Mossambique, Zool., V, 1862, p. 469; Pl. xxx, fig. 8. F. KOHL, Jahrb. Hamburg. wiss. Anst., X, 2, (1892), 1893, p. 187; Ann. naturh. Hofmus. Wien, IX, 1894, pp. 321, 323, and 335; Pl. xv, fig. 76; Pl. xvii, figs. 128 and 131 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80. GRIBODO, Mem. Ac. Sc. Bologna, (5), V, 2, 1895, Sc. nat., p. 88. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 35. A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 269. E. ZAVATTARI, Il Ruwenzori, Parte Scientif., I, Zool., 1909, p. 211.

Mozambique, Delagoa Bay, German East Africa.—Type locality: "Inhambane."

21. *Belonogaster leonhardii* R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 217 and 252 (♀).

Uganda.—Type locality: "Iraouer."

22. *Belonogaster longistylus* H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 89 and 97; Pl. xvii, fig. 13 (♀); Abh. Senckenberg. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 207. DALLA TORRE, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 336. A. v. SCHULTHESS, Reise Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 64. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 214 and 231 (♀).

Madagascar.—Type locality: "Madagascar."

23. *Belonogaster madecassus* (H. DE SAUSSURE) F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 94. H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, 1890, pp. 89 and 98; Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 207 and 211. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 337. DALLA TORRE, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, p. 261.

Raphigaster madecassus H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 16; Pl. II, fig. 7 (♀).

Madagascar.—Type locality: "Madagascar."

24. *Belonogaster malagassus* H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 207 and 210 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 80. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 214 and 230 (♀).

Madagascar, Nossi Bé.—Type locality: "Madagascar."

25. *Belonogaster petiolatus* (DE GEER) F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 337. DALLA TORRE, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. A. TULLGREN, Ark. f. Zool., I, 1904, p. 461. W. A. SCHULZ, Berlin. entom. Zeitschr., LVII, 1912, p. 62.

Vespa petiolata DE GEER, Mém. Hist. Insectes, VII, 1778, p. 610; Pl. xlv, fig. 10.

Belonogaster brachycerus F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 323, 324, and 331; Pl. xv, fig. 82; Pl. xvii, fig. 138 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 114; Gen. Ins. Vesp., 1904, p. 80. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 217, 218, 254, and 264 (♀ ♂) (ethology).

Transvaal, Griqualand, Bechuanaland, German Southwest Africa, Basutoland, Cape Colony, Natal.—Type locality: "Cap de Bonne-Espérance."

26. *Belonogaster prasinus* H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 89 and 92; Pl. xix, fig. 5 (♀ ♂); Abh. Sencken-

berg. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 207. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 337. DALLA TORRE, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. A. v. SCHULTHESS, Reise Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 63. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 214 and 228 (♀ ♂).

Madagascar, Nossi Bé.—Type locality: "forêts à l'est de l'Antsihanaka."

26a. var. **bicolor** (H. DE SAUSSURE R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, p. 229 (♀)).

Belonogaster bicolor H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 207 and 208. DALLA TORRE, Gen. Ins. Vesp., 1904, p. 80.

Madagascar.—Type locality: "Madagascar."

27. **Belonogaster pusillus** F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 320, 323, 325, and 337; Pl. xv, figs. 75 and 77; Pl. xvi, fig. 116; Pl. xvii, figs. 137, 140, 143, and 148 (♀ ♂). DALLA TORRE, Cat. IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 215, 218, 239, and 264; Pl. iv, fig. 2 (♀ ♂) (ethology); Voy. Alluaud et Jeannel, Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 161. A. TULLGREN, Ark. f. Zool., I, 1904, p. 454.

Sierra Leone, Togo, Portuguese Guinea, Belgian Congo, British and German East Africa.—Type locality: "Sierra Leone."

28. **Belonogaster rothkirchi** A. v. SCHULTHESS, Soc. entomol. XXIX, 1914, p. 4 (♂); Deutsche entom. Zeitschr., 1914, p. 288, fig. (♂).

Cameroon.—Type locality: "Kamerunberg, Soppo, 730 m."

29. **Belonogaster saëvus** H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 92, footnote (♀). F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 337. DALLA TORRE, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 216, 219, 242, and 264; Pl. iv, figs. 10 and 11 (♀ ♂). A. v. SCHULTHESS, Wiss. Ergebn. D. Z. Afrik. Exp., (1907-08), IV, Lf. 10, 1912, p. 291; Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 338.

Belonogaster occidentalis A. TULLGREN, Ark. f. Zool., I, 1904, p. 455; Pl. xxv, fig. 14 (♀ ♂).

Sierra Leone, Grand Bassam, Togo, Cameroon, Spanish Guinea, French and Belgian Congo, Uganda, Somaliland, German East Africa, Transvaal, Natal.—Type locality unknown.

30. **Belonogaster saussurei** W. F. KIRBY, Proc. Zool. Soc. London, 1881, p. 649 (♀ ♂); 1898, p. 386; Nat. Hist. of Sokotra by H. D. Forbes, Zool. Hym., 1903, p. 248; Pl. xvi, fig. 2 (♀ ♂) (ethology). F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 337; Denkschr. k. Ak. Wiss. Wien, math. naturh. Kl., LXXI, 1, 1907, p. 223; Pl. v, figs. 18, 20, and 31 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, p. 262.

Belonogaster tricolor O. TASCHENBERG, Zeitschr. f. ges. Naturw. Halle, LVI, 1883, p. 175 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 337. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, p. 261.

Socotra Island, Southern Arabia.—Type locality: "Sokotra, Hadibu Plain."

31. **Belonogaster tarsatus** F. KOHL, Jahrb. Hamburg. wiss. Anst., X, 2, (1892), 1893, p. 187; Pl., figs. 2, 5, 8, 12, and 16 (♀ ♂); Ann. naturh. Hofmus.

Wien, IX, 1894, pp. 321, 323, 333, and 337; Pl. xv, figs. 85 and 86; Pl. xvi, figs. 97 and 119; Pl. xvii, figs. 150, 153, and 154 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 35. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 215, 219, 237, and 263; Pl. iv, fig. 7 (♀ ♂).

German East Africa, Zanzibar.—Type locality: "Mbusini (Usegua)."

32. **Belonogaster tessmanni** A. v. SCHULTHESS, Soc. entomol., XXV, 1910, p. 45 (♀ ♂); Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 339 (♀ ♂).

Spanish Guinea.—Type locality: "Spanisch Guinea, Uelleborg, Benitogebiet."

33. **Belonogaster turbulentus** F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 323, 330, and 337; Pl. xv, fig. 87; Pl. xvi, fig. 101; Pl. xvii, fig. 147 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 215, 216, 240, and 264; Pl. II, fig. 13 (♀). A. v. SCHULTHESS, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 338. A. TULLGREN, Ark. f. Zool., I, 1904, p. 454.

Sierra Leone, Spanish Guinea, Cameroon, Belgian Congo.—Type locality: "Sierra Leone."

34. **Belonogaster turgidus** F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, pp. 322, 333, and 337; Pl. xv, fig. 74; Pl. xvi, fig. 114 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 116; Gen. Ins. Vesp., 1904, p. 80. R. DU BUYSSON, Ann. Soc. ent. France, LXXVIII, 2, 1909, p. 260 (♀).

Fernando Po.—Type locality: "Fernando Po."

35. **Belonogaster vasseæ** R. DU BUYSSON, Bull. Soc. ent. France, 1906, p. 189 (♀); Ann. Soc. ent. France, LXXVIII, 2, 1909, pp. 213, 219, and 263; Pl. II, fig. 8 (♀) (ethology); Voy. Alluaud et Jeannel, Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 160 (♂). A. v. SCHULTHESS, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 337; Soc. entomol., XXVII, 1912, p. 41.

Spanish Guinea, French Congo, Belgian Congo, British and German East Africa, Nyasaland, Zambesi, Tanganyika.—Type locality: "bassin inférieur du Zambèze, de la vallée de la Muza, à une altitude de 1000 à 1200 m."

26. **Polybioides** R. DU BUYSSON

Bull. Soc. ent. France, 1913, p. 299.

Genotype: *Vespa tabida* Fabricius, 1781.

1. **Polybioides melaina** (G. MEADE WALDO).

Polybia melaina G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), VII, 1911, p. 110 (♀ ♂). A. v. SCHULTHESS, Wiss. Ergebn. D. Z. Afrik. Exp., (1907-08), IV, Lf. 10, 1912, p. 292.

Parapolybia tabida var. *melaina* A. v. SCHULTHESS, Mitt. Schweiz. ent. Ges., XII, Heft. 4, 1913, p. 163 (♀); Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 341.

Polybioides tabida var. *melaina* R. DU BUYSSON, Voy. Alluaud et Jeannel, Afr. or., Res. sc., Ins. Hym., III, Vesp., 1914, p. 164.

Central part of equatorial Africa: Uganda, Rugege, Mt. Kenia, Mt. Ruwenzori, and towards the west in the Belgian Congo, as far as Stanleyville and Uele; up to 1800 m. in the mountains.—Type locality: "between Salt Lake and Wawamba, near Mount Ruwenzori."

2. **Polybioides tabida** (FABRICIUS) R. DU BUYSSON, Bull. Soc. ent. France, 1913, p. 299 (♀); Voy. Alluaud et Jeannel, Afr. or., Rés. sc., Ins. Hym., III, Vesp., 1914, p. 163.

Vespa tabida FABRICIUS, Spec. Insect., I, 1781, p. 468; Mantis. Ins., I, 1787, p. 293.

Polybia tabida H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 209; Pl. XXVI, fig. 4 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 133. DALLA TORRE, Cat., IX, Vesp., 1894, p. 166; Gen. Ins. Vesp., 1904, p. 78. A. v. SCHULTHESS, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 341; Deutsche entom. Zeitschr., 1914, p. 290. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 343. A. TULLGREN, Ark. f. Zool., I, 1904, p. 456. W. A. SCHULZ, Spolia Hymenopterologica, 1906, p. 323; Berliner ent. Zeitschr., LVII, 1912, p. 85.

Parapolybia tabida A. v. SCHULTHESS, Mitt. Schweiz. ent. Ges., XII, Heft 4, 1913, p. 162; Pl. XI, fig. 6; Pl. XI B, fig. 11 (♀).

Polybia bucula R. DU BUYSSON, Bull. Soc. ent. France, 1902, p. 253 (♀) (ethology).

The typical form has a wide distribution in West Africa: Cameroon, Fernando Po, Assinia, French Congo, Belgian Congo.—Type locality: “in Africa æquinoctiali.”

2a. var. **isabellina** (A. v. SCHULTHESS).

Parapolybia tabida var. *isabellina* A. v. SCHULTHESS, Mitt. Schweiz. ent. Ges., XII, Heft 4, 1913, p. 163 (♀); Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 341.

West Africa: Gold Coast, Spanish Guinea, Cameroon.—Type locality: not given.

ROPALIDIINÆ

27. **Ropalidia** GUÉRIN MENEVILLE

In Duperrey, Voyage de la Coquille, Zoologie, Atlas, Insectes, Pl. ix, fig. 8, 1831.

Rhopalidia GUÉRIN MENEVILLE, in Duperrey, Voyage de la Coquille, Zoologie, II, 2^e partie, 1^{re} division, 1838, p. 266. (*nec Rhopalidia* LEPELETIER, Hist. nat. Ins. Hym., I, 1836, p. 538).

Icaria H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 22.

Genotype: *Ropalidia maculiventris* Guérin, 1831.

1. **Ropalidia æthiopica** (R. DU BUYSSON).

Icaria æthiopica R. DU BUYSSON, Rev. d'Ent. Caen, XXV, 1906, p. 110 (♀ ♂).

Abyssinia.—Type locality: “Dirouhoria.”

? **Ropalidia africana** (P. CAMERON).

Icaria africana P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 170 (♀).

East Africa.—Type locality: “Kilimandjaro, Kibonoto, 1000–1200 m.”

According to G. Meade Waldo, Ann. Mag. Nat. Hist., (8), XI, 1913, p. 53, a synonym of *R. distigma* (Gerstæcker); according to A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 13, of *R. cincta* (Lepeletier). This species is very doubtful.

2. **Ropalidia ambigua** (GRIBODO).

Icaria ambigua GRIBODO, Mem. Ac. Sc. Bologna, (5), IV, 1894, Sc. nat., p. 58 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 73. R. DU BUYSSON, Voy. Alluaud et Jeannel, Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 155 (ethology).

Cape Colony, Transvaal, Mozambique, German East Africa, Gaboon.—Type locality: “fiume Magnarra, Mozambico.”

Probably a synonym of *R. capensis* (Saussure).

3. **Ropalidia anarchica** (H. DE SAUSSURE).

Icaria anarchica H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 34; Pl. v, fig. 4 (♀); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 113 and 121 (♀); Abh. Senckenberg. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 214. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 96. DALLA TORRE, Cat., IX, Vesp., 1894, p. 117; Gen. Ins. Vesp., 1904, p. 73. C. T. BINGHAM, Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 110.

Southern Arabia, Madagascar.—Type locality: "Madagascar."

4. **Ropalidia antennata** (H. DE SAUSSURE).

Icaria antennata H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 136, footnote (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 117; Gen. Ins. Vesp., 1904, p. 73. A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 270.

Mozambique.—Type locality: "côte de Mozambique."

5. **Ropalidia atra** (H. DE SAUSSURE).

Icaria atra H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 113 and 119 (♀); Abh. Senckenberg. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 215. DALLA TORRE, Cat., IX, Vesp., 1894, p. 117; Gen. Ins. Vesp., 1904, p. 73.

Madagascar.—Type locality: "Sud-est de Madagascar."

6. **Ropalidia bicincta** (H. DE SAUSSURE).

Icaria bicincta H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 114 and 136; Pl. iv, figs. 3 and 3b; Pl. xviii, fig. 20; Pl. xxii, fig. 2 (♀) (ethology); Abh. Senckenberg. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 218 and 232 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 117; Gen. Ins. Vesp., 1904, p. 73.

Madagascar, Nossi Bé.—Type locality: "Madagascar."

7. **Ropalidia brazzai** (R. DU BUYSSON).

Icaria brazzai R. DU BUYSSON, Rev. d'Ent. Caen, XXV, 1906, p. 110 (♀).

French Congo.—Type locality: "Congo, Lékéti."

Probably a synonym of *R. guttatipennis* (Saussure).

8. **Ropalidia capensis** (H. DE SAUSSURE).

Icaria capensis H. DE SAUSSURE, Entom. Zeitg. Stettin, XXIII, 1862, p. 139 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 118; Gen. Ins. Vesp., 1904, p. 73. P. CAMERON, Trans. South African Philos. Soc., XV, 4, 1905, p. 230 (♂); Ann. Transvaal Mus., II, 3, 1910, p. 155.

Cape Colony, Transvaal, Belgian Congo.—Type locality: "le Cap de Bonne-Espérance."

R. ambigua (Gerstæcker) is probably a synonym of this.

9. **Ropalidia carinata** (H. DE SAUSSURE).

Icaria carinata H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 113 and 122 (♀ ♂); Abh. Senckenberg. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 215 and 222 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 118; Gen. Ins. Vesp., 1904, p. 73. A. v. SCHULTHESS, Reise in Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 64.

Madagascar.—Type locality: "Madagascar."

? **Ropalidia cariniscutis** (P. CAMERON).

Icaria cariniscutis P. CAMERON, Wiss. Ergebn. Schwed. Zool., Exp. Kilimandjaro, II, 8, 6, 1910, pp. 170 and 171 (♀).

East Africa.—Type locality: "Usambara: Mombo."

According to G. Meade Waldo, *Ann. Mag. Nat. Hist.*, (8), XI, 1913, p. 53, a synonym of *R. distigma* (Gerstaecker); according to A. v. Schulthess, *Ark. f. Zool.*, VIII, No. 17, 1913, p. 13, the female is *R. cincta* (Lepeletier), but the male belongs to another species; the latter sex, however, was not described by Cameron.

10. **Ropalidia cincta** (LEPELETIER).

Epipona cincta LEPELETIER, *Hist. nat. Ins. Hym.*, I, 1836, p. 541 (♀).

Icaria cincta H. DE SAUSSURE, *Et. fam. Vesp.*, II, Vesp., 1853, p. 39; Pl. v, fig. 9 (♀ ♂); *Mém. Soc. Phys. Hist. nat. Genève*, XVII, 1863, p. 234 (♂). F. SMITH, *Cat. Hym. Brit. Mus.*, V, Vesp., 1857, p. 97. A. GERSTAECKER, *Arch. f. Naturg.*, XXXVII, 2, 1871, p. 351; in v. d. Decken's *Reisen in Ost-Afrika*, III, 2, Gliederth., 1873, p. 324. WALKER, *List Hym. Egypt*, 1871, p. 40. A. SCHLETTERER, *Ann. Soc. ent. Belgique*, XXXV, 1891, p. 28. DALLA TORRE, *Cat.*, IX, Vesp., 1894, p. 118; *Gen. Ins. Vesp.*, 1904, p. 73. H. STADELMANN, *Deutsch Ost-Afrika*, IV, 1898, *Hym.*, p. 33. MAGRETTI, *Ann. Mus. civ. Genova*, (2), XIX, 1898, p. 35. MORICE, *Res. Swed. Zool. Exp. Jägerskiöld*, pt. I, *Hym. ac.*, 1904, p. 6. C. T. BINGHAM, *Journ. Bombay Nat. Hist. Soc.*, XII, 1, 1898, p. 110; *Ann. Mag. Nat. Hist.*, (7), XII, 1903, p. 48; *Trans. Zool. Soc. London*, XIX, 2, 1909, p. 182. A. v. SCHULTHESS, *Bull. Soc. Vaudoise Sc. nat.*, (4), XXXV, 1899, p. 269; *Wiss. Ergebn. D. Z. Afr. Exp.*, (1907-08), IV, Lf. 10, 1912, p. 291; *Deutsche entom. Zeitschr.*, 1914, p. 290. E. ZAVATTARI, *Boll. Mus. Zool. Anat. comp. Torino*, XXII, No. 548, 1907, p. 2. P. CAMERON, *Ann. Transvaal Mus.*, II, 3, 1910, p. 155. R. DU BUYSSON, *Voy. Alluaud et Jeannel, Afr. or.*, Rés. Sc., *Ins. Hym.*, III, Vesp., 1914, p. 156. E. ROUBAUD, *Ann. Sc. nat. Zool.*, (10), I, 1, 1916, p. 140, fig. 32 (ethology).

Icaria tricinctella GRIBODO, *Mem. Ac. Sc. Bologna*, (5), V, 2, *Sc. nat.*, 1895, p. 87 (♀ ♂). DALLA TORRE, *Gen. Ins. Vesp.*, 1904, p. 74. MAGRETTI, *Ann. Mus. civ. Genova*, (2), XIX, 1898, p. 595.

Icaria xanthura MAGRETTI, *Ann. Mus. civ. Genova*, XXI, 1884, p. 606 [*nec Icaria xanthura* H. DE SAUSSURE; see Gribodo, *Mem. Ac. Sc. Bologna*, (5), V, 2, 1895, *Sc. nat.*, p. 87].

Casamance, Gambia, Belgian Congo, Upper Nile, Abyssinia, Somaliland, British and German East Africa, Mozambique, Transvaal, Southern Arabia. On Mt. Ruwenzori as high as 2000 m.—Type locality: "Sénégal."

11. **Ropalidia clavata** (H. DE SAUSSURE).

Icaria clavata H. DE SAUSSURE, *Et. fam. Vesp.*, II, Vesp., 1853, p. 40 (♀). F. SMITH, *Cat. Hym. Brit. Mus.*, V, Vesp., 1857, p. 97. DALLA TORRE, *Cat.*, IX, Vesp., 1894, p. 118; *Gen. Ins. Vesp.*, 1904, p. 73. C. T. BINGHAM, *Ann. Mag. Nat. Hist.*, (7), XII, 1903, pp. 48 and 68.

Cape Colony, Natal, Transvaal.—Type locality: "le Cap de Bonne-Espérance."

12. **Ropalidia constitutionalis** (H. DE SAUSSURE).

Icaria constitutionalis H. DE SAUSSURE, *Et. fam. Vesp.*, II, Vesp., 1853, p. 30; Pl. iv, fig. 4 (♀); in Grandidier, *Hist. Madagascar*, XX, pt. 1, *Hym.*, 1890, pp. 114 and 128 (♀); *Abh. Senckenb. naturf. Ges. Frankfurt a. M.*, XXVI, 2, 1900, pp. 216 and 222 (♀ ♂). F. SMITH, *Cat. Hym. Brit. Mus.*, V, Vesp., 1857, p. 95. DALLA TORRE, *Cat.*, IX, Vesp., 1894, p. 118; *Gen. Ins. Vesp.*, 1904, p. 73; Pl. v, figs. 3a and 3b.

Madagascar.—Type locality: "Madagascar."

13. **Ropalidia democratica** (H. DE SAUSSURE).

Icaria democratica H. DE SAUSSURE, *Et. fam. Vesp.*, II, Vesp., 1853, p. 33 (♀);

in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 115 and 142 (♀ ♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 96. ED. ANDRÉ, Le Naturaliste, 1889, p. 189 (ethology). DALLA TORRE, Cat., IX, Vesp., 1894, p. 118; Gen. Ins. Vesp., 1904, p. 73.

Madagascar.—Type locality: "Madagascar."

14. **Ropalidia distigma** (GERSTÆCKER).

Icaria distigma GERSTÆCKER, Monatsber. k. Preuss. Ak. Wiss. Berlin, 1857, p. 464 (♀); in Peters, Reise n. Mossambique, Zool., V, 1862, p. 471. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 343. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 33. DALLA TORRE, Cat., IX, Vesp., 1894, p. 118; Gen. Ins. Vesp., 1904, p. 73. A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 270. R. DU BUYSSON, Voy. Alluaud et Jeannel, Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 157.

British and German East Africa, Rhodesia, Mozambique, Transvaal, Natal.—Type locality: "Inhambane."

15. **Ropalidia dubia** (H. DE SAUSSURE).

Icaria dubia H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 33 (♀); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 115 and 141; Pl. xviii, fig. 19 (♀); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 216, 217, and 229 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 96. DALLA TORRE, Cat., IX, Vesp., 1894, p. 118; Gen. Ins. Vesp., 1904, p. 73. A. v. SCHULTHESS, Reise in Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 65.

Madagascar.—Type locality: "Madagascar."

16. **Ropalidia ducalis** (H. DE SAUSSURE).

Icaria ducalis H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 216 and 226 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 73.

Madagascar.—Type locality: "Madagascar."

17. **Ropalidia fraterna** (H. DE SAUSSURE).

Icaria fraterna H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 216 and 225 (♀ ♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 73. A. v. SCHULTHESS, Reise in Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 65.

Madagascar, Fundu Island (near Pemba Island).—Type locality: "Madagascar: Imerina."

18. **Ropalidia galimatia** (H. DE SAUSSURE).

Icaria galimatia H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 36 (♀ ♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 96. DALLA TORRE, Cat., IX, Vesp., 1894, p. 119; Gen. Ins. Vesp., 1904, p. 73.

Icaria madecassa H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 113, 114, and 125; Pl. xviii, fig. 16 (♀ ♀); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 216 and 224 (♀). A. v. SCHULTHESS, Reise in Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 64.

Madagascar, Nossi Bé.—Type locality: "Madagascar."

18a. var. **ignobilis** (H. DE SAUSSURE).

Icaria ignobilis H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 114 and 127; Pl. iv, figs. 7 and 7b (♀ ♂); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 216 and 224 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 119; Gen. Ins. Vesp., 1904, p. 73. A. v. SCHULTHESS, Reise in Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 64.

Madagascar.— Type locality: "Madagascar."

19. **Ropalidia grandidieri** (H. DE SAUSSURE).

Icaria grandidieri H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 113 and 120; Pl. iv, figs. 5 and 5b (♀ ♂); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 215 and 221 (♀ ♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 119; Gen. Ins. Vesp., 1904, p. 73. A. v. SCHULTHESS, Reise in Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 64.

Madagascar, Nossi Bé.— Type locality: "Madagascar."

20. **Ropalidia guttatipennis** (H. DE SAUSSURE).

Icaria guttatipennis H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 40; Pl. v, fig. 8 (♀). F. SMITH, Trans. Ent. Soc. London, (2), III, 1856, Proc., p. 129 (ethology); Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 97. F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 343. DALLA TORRE, Cat., IX, Vesp., 1894, p. 119; Gen. Ins. Vesp., 1904, p. 73. MAGRETTI, Ann. Mus. civ. Genova, (2), XIX, 1898, p. 35. RADOSZKOWSKY, Journ. Sc. math. phys. nat. Lisboa, VIII, No. 31, 1881, p. 204. ED. ANDRÉ, Le Naturaliste, 1889, p. 189 (ethology). C. T. BINGHAM, Fauna of Brit. India, Hym., I, 1897, p. 387; Pl. III, fig. 2 (♀ ♂). A. v. SCHULTHESS, Reise in Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 66; Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 340; Deutsche entom. Zeitschr., 1914, p. 290. R. DU BUYSSON, Ann. Soc. ent. France, LXVI, 2-3, 1898, p. 361; Voy. Alluaud et Jeannel, Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 156. E. ROUBAUD, Ann. Sc. nat. Zool., (10), I, 1, 1916, p. 141 (ethology).

Icaria politica H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 240 (♀ ♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 97. DALLA TORRE, Cat., IX, Vesp., 1894, p. 120; Gen. Ins. Vesp., 1904, p. 74.

Senegal, Grand Bassam, Gambia, Spanish Guinea, Cameroon, Belgian Congo, Gaboon, Angola, British and German East Africa, Transvaal, Natal, Somaliland, (British India).— Type locality: "le Sénégal."

21. **Ropalidia hova** (H. DE SAUSSURE).

Icaria hova H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 104, fig. A (ethology); pp. 113, 114, and 131; Pl. iv, figs. 2 and 2b (♀ ♀ ♂); Abh. Senckenberg. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 217 and 228. DALLA TORRE, Cat., IX, Vesp., 1894, p. 119; Gen. Ins. Vesp., 1904, p. 73.

Madagascar.— Type locality: "Madagascar."

21a. var. **minor** (H. DE SAUSSURE).

Icaria hova var. *minor* H. DE SAUSSURE, Abh. Senckenberg. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 217 (♀).

Madagascar.— Type locality: "Madagascar."

22. **Ropalidia interjecta** (H. DE SAUSSURE).

Icaria interjecta H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 216 and 225 (♀ ♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 73. A. v. SCHULTHESS, Reise in Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 65.

Madagascar, Nossi Bé.— Type locality: "Madagascar."

23. **Ropalidia irrequieta** (F. KOHL).

Icaria irrequieta F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 222; Pl. II, figs. 1, 13, and 14 (♀).

Southern Arabia.— Type locality: "Ras Farták."

? **Ropalidia maculata** (RADOSZKOWSKY).

Icaria maculata RADOSZKOWSKY, Journ. Sc. math. phys. nat. Ac. Lisboa, VIII, No. 31, 1881, p. 204 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 119; Gen. Ins. Vesp., 1904, p. 74.

Angola.—Type locality: "Angola."

A very doubtful species.

? **Ropalidia nigrofemorata** (P. CAMERON).

Icaria nigrofemorata P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 170 (♀).

East Africa.—Type locality: "Usambara."

According to A. v. Schulthess, Ark. f. Zool., VIII, No. 17, 1913, p. 13, the type has lost its abdomen and can not be identified.

24. **Ropalidia nitidula** (H. DE SAUSSURE).

Icaria nitidula H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 113 and 122; Pl. xviii, fig. 17 (♀); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 217 and 227 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 120; Gen. Ins. Vesp., 1904, p. 74.

Madagascar.—Type locality: "Madagascar."

25. **Ropalidia nobilis** (GERSTÆCKER).

Icaria nobilis GERSTÆCKER, Monatsb. k. Preuss. Ak. Wiss. Berlin, 1857, p. 464 (♀); in Peters, Reise n. Mossambique, Zool., V, 1862, p. 470; Pl. xxx, fig. 9 (♀). H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 114 and 133, footnote (♀). F. KOHL, Jahrb. Hamburg. wiss. Anst., X, 2, (1892), 1893, p. 189. DALLA TORRE, Cat., IX, Vesp., 1894, p. 120; Gen. Ins. Vesp., 1904, p. 74. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 33.

Zanzibar, Mozambique, German East Africa.—Type locality: "Mossambique."

Probably a synonym of *R. guttatipennis* (Saussure).

26. **Ropalidia phalansterica** (H. DE SAUSSURE).

Icaria phalansterica H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 35; Pl. iv, fig. 5; Pl. v, fig. 1 (♀); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 115 and 140 (♀ ♀ ♂); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 218 and 232. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 96. Ed. ANDRÉ, Le Naturaliste, 1889, p. 189 (ethology). DALLA TORRE, Cat., IX, Vesp., 1894, p. 120; Gen. Ins. Vesp., 1904, p. 74. A. v. SCHULTHESS, Reise in Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 65 (ethology).

Madagascar.—Type locality: "Madagascar."

27. **Ropalidia pomicolor** (H. DE SAUSSURE).

Icaria pomicolor H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 32; Pl. v, fig. 3 (♀); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 113 and 117; Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 214. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 95. DALLA TORRE, Cat., IX, Vesp., 1894, p. 120; Gen. Ins. Vesp., 1904, p. 74.

Madagascar.—Type locality: "Madagascar."

28. **Ropalidia prasina** (H. DE SAUSSURE).

Icaria prasina H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 215, 216, and 220 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 74.

Madagascar.—Type locality: "Madagascar: Imerina."

29. **Ropalidia pulchella** (H. DE SAUSSURE).

Icaria pulchella H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt a. M.,

XXVI, 2, 1900, pp. 215 and 223, fig. 4 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 74.

Nossi Bé.—Type locality: "Nossi-Bé."

30. **Ropalidia ranavali** (H. DE SAUSSURE).

Icaria ranavali H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 114 and 138; Pl. xviii, figs. 18 and 18c (♀ ♂); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 218 and 230. DALLA TORRE, Cat., IX, Vesp., 1894, p. 120; Gen. Ins. Vesp., 1904, p. 74.

Madagascar.—Type locality: "Madagascar."

31. **Ropalidia regina** (H. DE SAUSSURE).

Icaria regina H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 215 and 220 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 74.

Madagascar.—Type locality: "Madagascar: Antannarivo."

32. **Ropalidia sakalava** (H. DE SAUSSURE).

Icaria sakalava H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 217 and 228 (♀). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 74. A. v. SCHULTHESS, Reise in Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 65 (♂).

Madagascar.—Type locality: "Madagascar: Antannarivo."

33. **Ropalidia schulthessi** (H. DE SAUSSURE).

Icaria schulthessi H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 113 and 117; Pl. xviii, figs. 14 and 14b (♀); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 214. DALLA TORRE, Cat., IX, Vesp., 1894, p. 120; Gen. Ins. Vesp., 1904, p. 74.

Madagascar.—Type locality: "l'est de Madagascar."

34. **Ropalidia scottiana** (H. DE SAUSSURE).

Icaria scottiana H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 113 and 124 (♀); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 214. DALLA TORRE, Cat., IX, Vesp., 1894, p. 120; Gen. Ins. Vesp., 1904, p. 74.

Madagascar.—Type locality: "le sud-est de Madagascar."

35. **Ropalidia subclavata** (H. DE SAUSSURE).

Icaria subclavata H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 113, 114, and 134; Pl. iv, figs. 6 and 6b (♀ ♀ ♂); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 218 and 232. DALLA TORRE, Cat., IX, Vesp., 1894, p. 121; Gen. Ins. Vesp., 1904, p. 74.

Madagascar.—Type locality: "Madagascar."

36. **Ropalidia tomentosa** (GERSTÄCKER).

Icaria tomentosa GERSTÄCKER, Monatsb. k. Preuss. Ak. wiss. Berlin, 1857, p. 464 (♀); in Peters, Reise n. Mossambique, Zool., V, 1862, p. 471; Pl. xxx, fig. 10 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 121; Gen. Ins. Vesp., 1904, p. 74. A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 269. R. DU BUYSSON, Voy. Alluaud et Jeannel, Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 156.

Mozambique, British East Africa.—Type locality: "Tette."

R. aethiopica (R. du Buysson) is probably a synonym of this.

37. **Ropalidia variabilis** (H. DE SAUSSURE).

Icaria variabilis H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 114 and 135; Pl. xviii, fig. 15 (♀ ♂); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 218 and 231. DALLA TORRE, Cat., IX, Vesp., 1894, p. 121; Gen. Ins. Vesp., 1904, p. 74.

Madagascar.— Type locality: "Madagascar."

38. **Ropalidia velutina** (H. DE SAUSSURE).

Icaria velutina H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 114 and 129; Pl. iv, figs. 4 and 4b (♀); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 217 and 227 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 121; Gen. Ins. Vesp., 1904, p. 75.

Madagascar.— Type locality: "Madagascar."

39. **Ropalidia venustula** (H. DE SAUSSURE).

Icaria venustula H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 218 and 231 (♀ ♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 75.

Madagascar.— Type locality: "Madagascar: Imerina."

40. **Ropalidia vitripennis** (H. DE SAUSSURE).

Icaria vitripennis H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 113, 114, and 130 (♀); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, pp. 217 and 229 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 121; Gen. Ins. Vesp., 1904, p. 75.

Madagascar, Nossi Bé.— Type locality: "Madagascar."

41. **Ropalidia xanthura** (H. DE SAUSSURE).

Icaria xanthura H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 236 (♀); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 113 and 125 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 121; Gen. Ins. Vesp., 1904, p. 75.

Madagascar.— Type locality: "Madagascar."

POLISTINÆ

28. **Polistes** LATREILLE

Hist. nat. Crust. Ins., III, (an X), 1802, p. 363.

Genotype: *Vespa gallica* Linné, 1767.

1. **Polistes albocalcaratus** R. DU BUYSSON, Bull. Soc. ent. France, 1905, p. 257 (♀ ♂). A. v. SCHULTHESS, Reise in Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 69.

Madagascar.— Type locality: "Ténérive."

2. **Polistes albicinctus** H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 144 and 148; Pl. xviii, fig. 21 (♀ ♀); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 234 (♂). DALLA TORRE, Cat., IX, Vesp., 1894, p. 122; Gen. Ins. Vesp., 1904, p. 68. A. v. SCHULTHESS, Reise in Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 68.

Madagascar.— Type locality: "Madagascar."

3. **Polistes aquilinus** R. DU BUYSSON, Bull. Soc. ent. France, 1905, p. 256 (♀). A. v. SCHULTHESS, Deutsche entom. Zeitschr., 1914, p. 290.

French Congo, Sierra Leone, Belgian Congo, Cameroon.— Type locality: "Ogooué."

4. **Polistes badius** A. GERSTÆCKER, Arch. f. Naturg., XXXVII, 1, 1871, p. 351 (♀); in v. d. Decken's Reisen in Ost-Afrika, III, 2, Gliederth., 1873, p. 325; Pl. xiv, fig. 1. DALLA TORRE, Cat., IX, Vesp., 1894, p. 123; Gen. Ins. Vesp., 1904, p. 69. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 34.

Zanzibar.—Type locality: "Wanga."

5. **Polistes bituberculatus** R. DU BUYSSON, Bull. Soc. ent. France, 1905, p. 257 (♀ ♂). A. v. SCHULTHESS, Reise in Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 69.

Madagascar.—Type locality: "région de Fort-Dauphin."

6. **Polistes defectivus** A. GERSTÆCKER, Arch. f. Naturg., XXXVII, 1, 1871, p. 351 (♀); in v. d. Decken's Reisen in Ost-Afrika, III, 2, Gliederth., 1873, p. 326. DALLA TORRE, Cat., IX, Vesp., 1894, p. 127; Gen. Ins. Vesp., 1904, p. 69. GRIBODO, Mem. Ac. Sc. Bologna, (5), V, 1895, Sc. nat., p. 85 (♀ ♂). H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 34.

German East Africa, Mozambique, Cape Colony.—Type locality: "Uru."

7. **Polistes ellenbergi** R. DU BUYSSON, Bull. Soc. ent. France, 1908, p. 64 (♀). A. v. SCHULTHESS, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 341.

Cameroon, Spanish Guinea, French Congo.—Type locality: "Talagouga, près de N'Jolé."

8. **Polistes fastidiosus** H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 60 (♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 104. GERSTÆCKER, in Peters, Reise n. Mossambique, Zool., V, 1862, p. 470. MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 607. DALLA TORRE, Cat., IX, Vesp., 1894, p. 127; Gen. Ins. Vesp., 1904, p. 69. GRIBODO, Mem. Ac. Sc. Bologna, (5), V, 1895, Sc. nat., p. 86 (♀). A. v. SCHULTHESS, Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 270. C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), XII, 1903, pp. 49 and 68. R. DU BUYSSON, Voy. Alluaud et Jeannel Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 157.

Polistes sp.? F. KOHL, Jahrb. Hamburg. wiss. Anst. X, 2, (1892), 1893, p. 186.

Senegambia, Grand-Bassam, Upper Dahomey, Belgian Congo, German and British East Africa, Mozambique, Transvaal, Cape Colony.—Type locality: "la Sénégalie."

8a. var. **sikoræ** (H. DE SAUSSURE).

Polistes sikoræ H. DE SAUSSURE, Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 233 (♀ ♂). DALLA TORRE, Gen. Ins. Vesp., 1904, p. 71. A. v. SCHULTHESS, Reise in Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, pp. 67 and 68 (♂).

Madagascar.—Type locality: "Madagascar."

9. **Polistes flavipennis** H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 52 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 104. DALLA TORRE, Cat., IX, Vesp., 1894, p. 127; Gen. Ins. Vesp., 1904, p. 69.

Cape Colony.—Type locality: "le Cap de Bonne-Espérance."

10. **Polistes haugi** R. DU BUYSSON, Bull. Soc. ent. France, 1906, p. 189 (♀ ♂); Voy. Alluaud et Jeannel Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 158. A. v. SCHULTHESS, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 341.

Spanish Guinea, Gaboon, British East Africa, Belgian Congo.—Type locality: "N'gomo, dans le bas Ogooué."

11. **Polistes macaensis** (FABRICIUS) R. C. L. PERKINS, Entom. Mo. Mag., (2), XII, 1901, p. 264 (♀ ♂). G. MEADE WALDO, Trans. Linn. Soc. London, (2), XV, Zool., 1, 1912, p. 44 (♀ ♂).

Vespa macaensis FABRICIUS, Entom. Syst., II, 1793, p. 259.

Polistes hebræus H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 143, fig. D, and p. 144 (ethology). GERSTÆCKER, in v. d. Decken's

Reisen in Ost-Afrika, III, 2, Gliederth., 1873, p. 324. J. PÉREZ, Ann. Soc. ent. France, LXIV, 1895, p. 206. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 34. A. v. SCHULTHESS, Reise in Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, pp. 67 and 68. P. CAMERON, Trans. Linn. Soc. London, (2), XII, Zool., 1, 1907, p. 71. F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXXI, 1908, p. 312; Pl. III, figs. 2, 10, and 11 (♂). (*nec Vespa hebræa* FABRICIUS, 1787).

South Africa (?), Madagascar, Nossi Bé, Mauritius, Réunion, Seychelles Islands, Chagos Islands, Amirantes Islands, Zanzibar, (Oriental region to the Islands of the Pacific); (Arabia, Egypt?).—Type locality: "in Macao Indiæ."

Perkins, *loc. cit.*, has first pointed out the characters separating *P. macaensis* (Fabricius) from *P. hebræus* (Fabricius); the occurrence of the latter species in the Malagasy subregion or on the African continent is very doubtful. G. Meade Waldo (1912) has furthermore shown that *P. macaensis* (Fabricius) is the lighter colored species; whereas the darker colored, with very short and pointed spines on the seventh tergite in the male, is the true *P. hebræus* (Fabricius) = *P. perkinsi* Kohl, 1908. I have seen specimens of *P. macaensis* (Fabricius) from Zanzibar and Mauritius.

12. **Polistes macrocephalus** J. BEQUAERT. See p. 261 (♀).

Belgian Congo.—Type locality: Walikale.

13. **Polistes maculipennis** H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 61; Pl. VI, fig. 4 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 131; Gen. Ins. Vesp., 1904, p. 70. C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), XII, 1903, p. 48. P. CAMERON, Ann. Transvaal Mus., II, 3, 1910, p. 155.

Transvaal, Nyasaland, Cape Colony.—Type locality: "Java et l'Afrique méridionale."

14. **Polistes madecassus** H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 51 (♀ ♀); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 144; Pl. IV, fig. 8 (♀). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 105. DALLA TORRE, Cat., IX, Vesp., 1894, p. 131; Gen. Ins. Vesp., 1904, p. 70. A. v. SCHULTHESS, Reise in Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, pp. 66 and 68, figs. 1-3 (♂).

Madagascar.—Type locality: "Madagascar."

15. **Polistes marginalis** FABRICIUS, Syst. Piez., 1804, p. 272. H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 62; Pl. VI, fig. 2 (♀ ♀ ♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 105. GERSTÆCKER, in v. d. Decken's Reisen in Ost-Afrika, III, 2, Gliederth., 1873, p. 325; Arch. f. Naturg., XXXVII, 1, 1871, p. 351. WALKER, List Hym. Egypt, 1871, p. 40. GRIBODO, Ann. Mus. civ. Genova, XVI, 1881, p. 238; XXI, 1884, p. 286; Mem. Ac. Sc. Bologna, (5), IV, 1894, Sc. nat., p. 60; (5), V, 1895, Sc. nat., p. 86. DALLA TORRE, Cat., IX, Vesp., 1894, p. 131; Gen. Ins. Vesp., 1904, p. 70. FOX, Proc. Ac. Nat. Sc. Philadelphia, XLVIII, 1896, p. 555. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 34. C. T. BINGHAM, Journ. Bombay Nat. Hist. Soc., XII, 1, 1898, p. 110; Ann. Mag. Nat. Hist., (7), XII, 1903, p. 48. A. v. SCHULTHESS, Reise in Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 68; Ark. f. Zool., VIII, No. 17, 1913, p. 13; Wiss. Ergebn. D. Z. Afrik. Exp., (1907-08), IV, Lf. 10, 1912, p. 291; Bull. Soc. Vaudoise Sc. nat., (4), XXXV, 1899, p. 270. R. DU BUYSSON, Ann. Soc. ent. France, LXVI, 2-3, 1898, p. 362; in A. Chevalier, L'Afrique centrale française, 1908, p. 707; Voy. Alluaud et Jeannel Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 159. P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 169;

Ann. Transvaal Mus., II, 3, 1910, p. 155. W. A. SCHULZ, Hymen. Studien, 1905, p. 15. E. ROUBAUD, Ann. Sc. nat. Zool., (10), I, 1, 1916, pp. 141-142 (ethology).

Vespa marginalis FABRICIUS, Syst. Entom., 1775, p. 367; Mantis. Ins., I, 1787, p. 289. OLIVIER, Encycl. méthod. Ins., VI, 1791, p. 685.

Polistes marginalis var. *stigma* MAGRETTI, Ann. Mus. civ. Genova, XXI, 1884, p. 607.

Distributed throughout the Ethiopian part of the African continent, from 20° N. lat. to the Cape; also in Southern Arabia.—Type locality: "in Cap. b. S."

15a. var. **africanus** (PALISOT DE BEAUVOIS) A. v. SCHULTHESS, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 340. R. DU BUYSSON, Voy. Alluaud et Jeannel Afr. or., Rés. Sc., Ins. Hym., III, Vesp., 1914, p. 159.

Polistes africana PALISOT DE BEAUVOIS, Ins. recueillis en Afrique et Amérique, 1805, p. 207; Atlas, Hymén., Pl. VIII, fig. 4. W. A. SCHULZ, Spolia Hymenopterologica, 1906, p. 228.

Polistes ornatus LEPELETIER, Hist. nat. Ins. Hym., I, 1836, p. 531.

Polistes plebejus A. GERSTÄCKER, Arch. f. Naturg., XXXVII, 1, 1871, p. 351 (♀); in v. d. Decken's Reisen in Ost-Afrika, III, 2, Gliederth., 1873, p. 325.

Polistes marginalis var. *plebejus* A. v. SCHULTHESS, Deutsche entom. Zeitschr., 1914, p. 290.

With the typical form, throughout the Ethiopian region.—Type locality: "Royaume d'Oware."

15b. var. **inornatus** (C. RITSEMA).

Polistes inornatus C. RITSEMA, Tijdschr. v. Ent., XVII, 1874, p. 203; Pl. XI, fig. 8 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 131; Gen. Ins. Vesp., 1904, p. 70. W. A. SCHULZ, Berliner ent. Zeitschr., LI, Heft 4, 1907, p. 314 (♀).

Belgian Congo (Banana).—Type locality: "Banana-Loango."

16. **Polistes rubidus** LEPELETIER, Hist. nat. Ins. Hym., I, 1836, p. 523 (♂). H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 50. F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 104. DALLA TORRE, Cat., IX, Vesp., 1894, p. 133; Gen. Ins. Vesp., 1904, p. 71.

South Africa.—Type locality: "Cap de Bonne-Espérance."

This species is very doubtful and probably not Ethiopian.

17. **Polistes saussurei** DALLA TORRE, Cat., IX, Vesp., 1894, p. 134; Gen. Ins. Vesp., 1904, p. 71.

Polistes incertus H. DE SAUSSURE, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 144 and 145; Pl. IV, fig. 9 (♀). A. v. SCHULTHESS, Reise in Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, pp. 67 and 68 (ethology). (nec *Polistes incertus* CRESSON, 1865).

Madagascar, Comoro Islands.—Type locality: "Madagascar."

18. **Polistes smithii** H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 60; Pl. VII, fig. 3 (♀); in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, pp. 144 and 146 (♀ ♂); Abh. Senckenb. naturf. Ges. Frankfurt a. M., XXVI, 2, 1900, p. 233 (♀ ♂). F. SMITH, Cat. Hym. Brit. Mus., V, Vesp., 1857, p. 104. GERSTÄCKER, in Peters, Reise n. Mossambique, Zool., V, 1862, p. 470. GRIBODO, Ann. Mus. civ. Genova, XXI, 1884, p. 287. A. SCHLETTERER, Ann. Soc. ent. Belgique, XXXV, 1891, p. 29. F. KOHL, Jahrb. Hamburg. wiss. Anst., X, 2, (1892), 1893, p. 186. DALLA TORRE, Cat., IX, Vesp., 1894, p. 134; Gen. Ins. Vesp., 1904, p. 71. P. MAGRETTI, Ann. Mus. civ. Genova, (2), XV, 1895, p. 169. H. STADELMANN, Deutsch Ost-Afrika, IV, 1898, Hym., p. 34. A. v. SCHULTHESS, Bull. Soc. Vaudoise

Sc. nat., (4), XXXV, 1899, p. 270; Reise in Ost-Afrika, (1903-05), Voeltzkow, Wiss. Ergebn., II, 2, 1907, p. 69; Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 340; Ark. f. Zool., VIII, No. 17, 1913, p. 13. C. T. BINGHAM, Ann. Mag. Nat. Hist., (7), XII, 1903, p. 48; Trans. Zool. Soc. London, XIX, 2, 1909, p. 182. P. CAMERON, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro, II, 8, 6, 1910, p. 169; Ann. Transvaal Mus., II, 3, 1910, p. 155. R. DU BUYSSON, Voy. Alluaud et Jeannel Afr. or., Rés. sc., Ins. Hym., III, Vesp., 1914, p. 158.

Throughout the continental part of the Ethiopian region; on Mt. Ruwenzori as high as 1200 m.; on Mt. Kilimandjaro as high as 1900 m.; (Madagascar?).— Type locality: "la Sénégalie."

19. **Polistes spilophorus** A. SCHLETTERER, Ann. Soc. ent. Belgique, XXXV, 1891, p. 29; Pl. I, fig. 12 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 134; Gen. Ins. Vesp., 1904, p. 71. W. A. SCHULZ, Spolia Hymenopterologica, 1906, p. 229.

Polistes piloptera F. KOHL, Ann. naturh. Hofmus. Wien, IX, 1894, p. 343.

Polistes tenellus R. DU BUYSSON, Bull. Soc. ent. France, 1905, p. 256 (♀ ♂). A. v. SCHULTHESS, Mitt. zool. Mus. Berlin, VI, Heft 3, 1913, p. 340; Deutsche entom. Zeitschr., 1914, p. 290.

Cameroon, Spanish Guinea, Gaboon, French Congo, Belgian Congo.— Type locality: "Equateur-Congo."

20. **Polistes tristis** G. MEADE WALDO, Ann. Mag. Nat. Hist., (8), VII, 1911, p. 101 (♀).

British East Africa.— Type locality: "Mombasa."

21. **Polistes tullgreni** W. A. SCHULZ, Spolia Hymenopterologica, 1906, p. 229 (♀).

Polistes inornatus A. TULLGREN, Ark. f. Zool., I, 1904, p. 456; Pl. xxv, figs. 15 a-b (♀). (*nec Polistes inornatus* RITSEMA, 1874).

Cameroon.— Type locality: "the Cameroons."

VESPINÆ

29. **Vespa** LINNÉ

Syst. Nat. (ed. 1a, 1735); ed. 10a, I, 1758, pp. 343 and 572.

Genotype: *Vespa crabro* Linné, 1758.

1. **Vespa orientalis** LINNÉ, Mantissa Plantarum, II, 1771, p. 540. H. DE SAUSSURE, Et. fam. Vesp., II, Vesp., 1853, p. 132; Pl. xiv, figs. 1 a-d. WALKER, List Hym. Egypt, 1871, p. 40. DALLA TORRE, Cat., IX, Vesp., 1894, p. 151; Gen. Ins. Vesp., 1904, p. 65. R. DU BUYSSON, Ann. Soc. ent. France, LXXIII, (1904), 3, 1905, p. 507 (♀ ♀ ♂); Bull. Soc. ent. France, 1908, p. 133. F. KOHL, Denkschr. k. Ak. Wiss. Wien, math. naturw. Kl., LXXI, 1, 1907, p. 221; Pl. v, figs. 3, 7, and 25 (♀ ♂).

Eastern part of the Mediterranean region, Egypt, Southern Arabia, Northwestern India; was found in the Central Sahara and in Abyssinia; also on Madagascar, where it was probably accidentally introduced (see H. de Saussure, in Grandidier, Hist. Madagascar, XX, pt. 1, Hym., 1890, p. 149).— Type locality: "in Oriente."

1a. var. **ægyptiaca** Ed. ANDRÉ, Spéc. Hym. Eur. Algér. II., fasc. 21-23, 1884,

p. 584. R. DU BUYSSON, Ann. Soc. ent. France, LXXIII, (1904), 3, 1905, p. 510 (♀ ♀ ♂).

Egypt, Arabia, Aden.—Type locality: "Le Caire."

2. **Vespa rubricans** J. PÉREZ, Actes Soc. Linn. Bordeaux, LXIV, 1910, p. 10 (♀).

German East Africa.—Type locality: "Lindi."

Doubtful Genus

Catilostenus MEUNIER

Il Naturalista Siciliano, VII, No. 6, 1888, p. 150.

1. **Catilostenus nigroviolaceus** MEUNIER, Il Naturalista Siciliano, VII, No. 6, 1888, p. 151 (♀). DALLA TORRE, Cat., IX, Vesp., 1894, p. 112; Gen. Ins. Vesp., 1904, p. 87.

Belgian Congo.—Type locality: "Banana."

Probably a species of *Synagris*.

INDEX

New names of species and varieties are printed in **heavy-faced type**, also the main references in a series of references; synonyms are printed in *italics*.

- abbreviata*, *Vespa*, 269.
abbreviatus, *Celonites*, 269.
abdominale, *Rhynchium*, 292.
abdominalis, *Odynerus*, 292.
Synagris, 321.
Vespa, 292.
aberratica, *Nortonia*, 94, 95, **285**.
aberraticus, *Odynerus*, 285.
abyssinica, *Synagris*, 125, 126, 196, 201, 205 (Fig. 230), 215, 217, **222**, **319**.
abyssinica var. *albofasciata*, *Synagris*, 126, 222, **223**, **320**.
abyssinica var. *emarginata*, *Synagris*, 196, **222**, **320**.
abyssinicum, *Rhynchium*, 293.
Rygchium, 156, 293.
abyssinicus, *Belonogaster*, 328.
acanthoaspis, *Odynerus*, 292.
acarophila*, *Nortonia, 6, 94, 95, **97** (Figs. 81–84), 105, **285**.
acuminatus, *Eumenes*, 86, **274**.
adelphus, *Labus*, 273.
adonis, *Odynerus*, 124, 195, **290**, 318.
ægyptiaca, *Nortonia*, **285**, 286.
Vespa orientalis var., 349.
ægyptiacus, *Odynerus*, 285.
æquatorialis, *Synagris*, 324.
æquinocialis, *Odynerus*, 292.
æquinoxialis, *Odynerus*, 292.
æstuans, *Odynerus*, 121, 126, 135, **138**, 139 (Figs. 124–130), 141, 142, 143, 223, **292**.
Odynerus, 127, 138, 300.
Rhynchium, 138, 292.
Rygchium, 141.
Synagris, 126, 140, 214, 217, **223**, 226, 265, **320**. Pl. I, Fig. 6.
Synagris, 292.
Vespa, 320.
æstuans var. *rufa*, *Synagris*, 224, **320**.
æthiopica, *Eumenes*, 281.
Icaria, 338.
Ropalidia, **338**, 344.
Synagris, 319.
æthiopicus, *Eumenes melanosomus* var., 65, 81, **84**, **281**.
Odynerus, 292.
affinis, *Eumenes melanosomus* var., 81, **282**.
Synagris, 325.
africana, *Icaria*, 338.
Polistes, 348.
Ropalidia, 338.
Vespa, 304.
africanum, *Rhynchium*, 304.
Rygchium, 304.
africanus, *Paramischocyttarus*, 272.
Polistes marginalis var., 348.
Tanyzethus, 36, 272.
agilis, *Belonogaster*, 334.
Belonogaster lateritius var., 334.
Alastor, 14, 21, 27, 121, **328**.
atropos, 328.
braunsi, 328.
bucida, 328.
lucida, 328.
promontorii, 328.
schinzii, 328.
Alastoroides, 14, 121.
albicinctus, *Polistes*, 345.
albifer, *Odynerus*, 315.
albocalcaratus, *Polistes*, 345.
albofasciata, *Synagris abyssinica* var., 126, 222, **223**, **320**.
albolimbatus, *Odynerus meyeri* var., 134, 181, **182**, **306**.
alboniger*, *Odynerus, 6, 132, **172**, 173 (Figs. 188–190), **292**.
alexandrinus, *Odynerus*, 290.
Oplopus, 290.
alfkeni, *Masariella*, 266.
Masaris, 266.

- alienus*, Odynerus, 315.
alluaudi, *Eumenes*, 277.
Eumenes lepeleterii var., 76, **277**.
amaliæ, Montezumia, 99, 105.
ambigua, *Icaria*, 338.
Ropalidia, 247, 250, **338**, 339.
americanus, *Polistes*, 257 (ethology).
amethystinum, *Stilbum cyanurum* var., 66.
amplissima, *Synagris*, 320.
analis, *Synagris*, 125, 196, 215, 216, **218**, 219, 222, 319, **320**.
analis var. *nigroclypeata*, *Synagris*, 219, **321**.
anarchica, *Icaria*, 339.
Ropalidia, 247, **339**.
anceps, Odynerus, 123 (ethology), 125, 129, 150, **154**, 155 (Figs. 154-162), 156 (ethology), 159, 165, **292**.
Rhynchium, 292.
Rygychium, 156, 292.
Ancistrocerus, 6, 14, 21, 27, 93, 94, 95-102, 103, 105, 106, 111, **112** (ethology), 113 (key to species), 122, **287**.
antilope, 112 (ethology).
bifasciatus, 112 (ethology).
biphaleratus, 287.
birenimaculatus, 112 (ethology).
budongo, 113, **114**, **287**.
callosus, 112 (ethology).
capensis, 287.
capra, 112 (ethology).
crassicornis, 112 (ethology).
fulvipes, 106.
gowdeyanus, 287.
imbecillus, 117, **288**.
impunctatus, 288.
inconstans, 288.
kisangani, 6, 105, 106, 111, 113, 114, **115** (Figs. 108-110), 265, **288**.
 Pl. I, Fig. 8.
lineaticollis, 120, **288**.
 var. *rufopictus*, 288.
lufiræ, 113, 114, **288**.
massaicus, 113, **114** (Fig. 107), 117, **288**.
massanensis, **288**, 289.
murarius, 112 (ethology).
neavei, 113, 114, **119**, 120 (Figs. 116-117), **289**.
neuvillei, 120, **289**.
nidulator, 112 (ethology).
oviventris, 112 (ethology).
parietum, 112 and 123 (ethology), 287.
pharao, 289.
roubaudi, 112 (ethology), **289**.
striativentris, 120, **289**.
trifasciatus, 112 (ethology).
zaiirensis, 6, 113, **117** (Figs. 111-115), **289**.
zebra, 120, **289**.
andreas, Odynerus, 124, **293**.
andrei, *Celonites*, 269.
angolensis, Odynerus, 124, 132, **135** (Figs. 118-121), 138, 171, **293**.
angustus, Odynerus, 194, **293**.
annulatus, *Labus*, 273.
annulipes, *Labus*, 49, **273**.
Antagris, 199, 319.
antennata, *Icaria*, 339.
Ropalidia, 339.
Antezumia, 14.
Anthrax, 72.
Anthreneida, 16.
antilope, *Ancistrocerus*, 112 (ethology).
apicalis, *Belonogaster*, 248, **329**.
apiformis, *Masaris*, 269.
Apis cornuta, 326.
Apoica, 15, 257.
aquilinus, *Polistes*, 5, 256, 257, 258, **259**, 260 (Figs. 250-254), **345**. Pl. I, Fig. 10.
arabicus, *Elimus*, 271.
arbustorum, *Eumenes*, 55 (ethology), 275.
Vespa, 275.
arcuatus, *Eumenes*, 60.
ardens, Odynerus, 125, 150, 156, **293**.
Rhynchium, 293, 314.
Rygychium, 293.
arethusæ, Odynerus, 293.
armata, *Stroudia*, 43, 273.
armatiscutis, Odynerus, 293.
armatus, *Labus*, 273.
artifex, *Eumenes*, 274.
Ropalidia, 247.
asina, *Eumenes*, 277.

- asinus*, *Eumenes lepeleerii* var., 76, 77, **277**.
asmarensis, *Odynerus*, 311.
Odynerus silaos var., 311.
astutus, *Labus*, 283.
Pachymenes, 88, **90** (Fig. 80), **283**.
ater, *Odynerus hæmorrhoidalis* var., 145.
Pachymenes, 87 (ethology).
aterrima, *Eumenes*, 282.
Icaria, 305.
Synagris, 125, 202, 228, **318**.
aterrimus, *Eumenes melanosomus* var., 54, 65, 81, **82**, **282**.
atra, *Icaria*, 339.
Ropalidia, 247, **339**.
Atractodes gueinzii, 221.
atrata, *Synagris inermis* var., 302.
atratum, *Rhynchium inerme* var., 302.
atratum, *Belonogaster*, 329.
Odynerus inermis var., 302.
atropos, *Alastor*, 328.
aurata, *Vespa*, 127, 162, 293.
auratus, *Odynerus*, 293.
aureo-maculatum, *Rhynchium*, 294.
aureosericeus, *Odynerus*, 293.
auro-maculatum, *Rhynchium*, 293.
Ryngchium, 293.
auro-maculatus, *Odynerus*, 123 (ethology), **293**.
australiensis, *Montezumia*, 99.
australis, *Elimus*, 271.
Icaria, 247.
azurescens, *Montezumia*, 289.
Odynerus, 289.
azurescens var. *rufidentata*, *Montezumia*, 289.
Odynerus, 289.
badius, *Polistes*, 345.
bairstowi, *Odynerus*, 127, **294**.
basalis, *Synagris*, 326.
Synagris cornuta var., 208, **209**, 226, 265, **326**. Pl. II, Fig. 5.
Belonogaster occidentalis, 336.
belfragei, *Eumenes*, 55 (ethology).
bellatulus, *Odynerus*, 123 (ethology), 132, 172, 175, 176, 177, 178, **294**.
bellatus, *Odynerus*, 294.
bellicosa, *Synagris*, 322.
Belonogaster, 4, 16, 21, 23, 24, 25, 28, 36, 40, **230** (Fig. 237, distribution), 231 (ethology), 233 (key to species), 239, 241, 243, 244, 248, 249, **328**.
abyssinicus, 328.
agilis, 334.
apicalis, 248, **329**.
atratus, 329.
bicolor, 336.
brachycerus, 335.
brachystomus, 329.
braunsii, 331.
brevipetiolatus, 232, **329**.
brunneus, 234, **329**.
buyssoni, 329.
clypeatus, 329.
colonialis, 334.
distinguendus, 234, 329.
dubius, 234, 235, **237** (ethology), 265, **330**. Pl. VI, Figs. 1 and 2.
elegans, 335.
erythrospilus, 332.
eumenoides, 330.
facialis, 330.
filiformis, 330.
filiventris, 236, **331**.
fleckii, 334.
freyi, 331.
fulvipennis, 332.
gracilis, 331.
griseus, 234, 236, **237**, **331**.
var. *fuscipennis*, 332.
var. *menelikii*, 332.
var. *pallens*, 332.
guerini, 332.
hildebrandti, 232, **333**.
indicus, 230, **333**.
var. *claripennis*, 333.
junceus, 231 (ethology), 234, **236**, 237, 265, 328, **333**. Pl. I, Fig. 9.
kohli, 331.
lateritius, 234, 235, **238** (ethology), **334**.
var. *agilis*, 334.
var. *elegans*, 334.
leonhardii, 335.
linearis, 331.
longistylus, 335.
macilentus, 331.

- Belonogaster madecassus*, 335.
malagassus, 335.
malagassus var., 329.
massaicus, 330.
menelikii, 332.
ornatus, 330.
petiolatus, 335.
pictus, 332.
pomicolor, 330.
prasinus, 248, 335.
 var. *bicolor*, 336.
pusillus, 234, 235, **236**, 329, **336**.
rothkirchi, 336.
rufipennis, 332.
sævus, 234, **236**, **336**.
sævus var., 330.
saussurei, 231 (ethology), **336**.
sex-maculatus, 330.
tarsatus, 336.
tessmanni, 337.
tricolor, 336.
turbulentus, 234, 235, **236**, **337**.
turgidus, 337.
vasseæ, 234, 337.
benütensis, *Odynerus*, 127, 162, 163, 297.
beyeri, *Ceramius*, 267.
bicincta, *Icaria*, 339.
 Ropalidia, 339.
bicinctus, *Eumenes*, 60, 65.
 Odynerus, 290.
bicolor, *Belonogaster*, 336.
 Belonogaster prasinus var., 336.
 Ceramius, 267.
 Philanthus, 267.
 Polistes, 255.
bifasciatus, *Ancistrocerus*, 112 (ethology).
biglumis, *Pterochilus*, 317.
bimaculata, *Montezumia*, 289.
 Synagris huberti var., 224, 226, **323**.
bioculatum, *Rhynchium*, 294.
biphaleratus, *Ancistrocerus*, 287.
 Odynerus, 287.
birenimaculatus, *Ancistrocerus*, 112 (ethology).
bisellatus, *Odynerus*, 294.
bisignatus, *Eumenes*, 275.
bisuturalis, *Labus*, 286.
 Nortonia, 94, 95, 96, **102**, 104 (Figs. 92-94), 105, 106, 107, 110, 116, **285**.
 Odynerus, 285.
bituberculatus, *Polistes*, 346.
bollii, *Eumenes*, 55 (ethology).
Bombus, 31, 207.
bothriogaster, *Odynerus*, 127, 159, **294**.
brachycerus, *Belonogaster*, 335.
brachystomus, *Belonogaster*, 329.
brasiliensis, *Labus*, 44.
braunsi, *Alastor*, 328.
braunsiana, *Raphiglossa*, 270.
 Rhaphidoglossa, 270.
braunsianus, *Eumenes*, 86, **275**.
braunsi, *Belonogaster*, 331.
 Nortonia, 94, 96, 102, 105, **106** (Fig. 95), 107, 116, **286**.
brazzai, *Icaria*, 339.
 Ropalidia, 250, **339**.
brevipetiolatus, *Belonogaster*, 232, **329**.
broomi, *Odynerus*, 297.
 Rethus, 278.
brunnea, *Vespa*, 300.
brunneum, *Rhynchium*, 300.
 Rhynchium hæmorrhoidale var., 301.
 Rygchium, 300.
brunneus, *Belonogaster*, 234, **329**.
bucida, *Alastor*, 328.
bucula, *Polybia*, 242, 338.
budongo, *Ancistrocerus*, 113, **114**, **287**.
 Odynerus, 287.
buyssoni, *Belonogaster*, 329.
 Paramischocyttarus, 36, 37 (ethology), **38**, 39 (Figs. 7-12), 265, **272**.
 Pl. I, Fig. 1.
 Paramiscocytharus, 272.
Caba, 15, 257.
cabeti, *Ropalidia*, 247.
caffer, *Ceramius*, 267.
 Eumenes, 10, 24, 55 (ethology), 56, 60, 65, **69**, 70 (Figs. 50-55), 71 (key to varieties; Fig. 56, distribution), **72** (ethology), **275**, 276.
caffer var. *dyscherus*, *Eumenes*, 65, 71, **74**, **275**.
caffer var. *esuriens*, *Eumenes*, 70, 71, 72 (ethology), **73**, **275**.
caffer var. *gracilis*, *Eumenes*, 71, **72**, **275**.

- caffra*, *Labus*, 286.
 Nortonia, 286.
 Vespa, 275.
calida, *Synagris*, 125, 201, 215, 218, **221**
 (ethology), **321**.
 Synagris, 220, 325.
 Vespa, 322.
Calligaster, 14, 30, 31, 271.
 cyanoptera, 31.
 delagoensis, 271.
 hero, 31.
callosus, *Ancistrocerus*, 112 (ethology).
cameroni, *Odynerus*, **294**, 317.
cameruna, *Eumenes*, 278.
canadensis, *Polistes*, 253, 254.
canaliculatus, *Eumenes*, 55 (ethology).
 Odynerus, 294.
capensis, *Ancistrocerus*, 287.
 Celonites, 269.
 Ceramius, 267.
 Eumenes, 86, **276**.
 Icaria, 339.
 Odynerus, 287.
 Pterochilus, 317.
 Quartinia, 270.
 Ropalidia, 249, **250** (Figs. 241-242),
 339.
capicola, *Ceramius*, 267.
 Odynerus, 294.
capitata, *Synagris*, 325.
capra, *Ancistrocerus*, 112 (ethology).
carbonaria, *Vespa*, 322.
carinata, *Icaria*, 339.
 Ropalidia, 339.
 Synagris, 125, **318**.
carinatus, *Odynerus*, 297.
 Zethus, 44.
cariniscutis, *Icaria*, 339.
 Ropalidia, 339.
carinulatus, *Odynerus*, 126, 127, 128, **157**
 (Figs. 163-168), 160, 161, **294**.
carnaticus, *Odynerus hæmorrhoidalis*
 var., 145.
carnifex, *Polistes*, 253.
Catilostenus, 350.
 nigroviolaceus, 350.
caviventris, *Odynerus*, **127**, **295**.
Celonites, 13, 21, **269**.
 abbreviatus, 269.
 andrei, 269.
 capensis, 269.
 clypeatus, 269.
 fischeri, 269.
 jousseamei, 269.
 oraniensis, 269.
 promontorii, 269.
 purcelli, 269.
 var. *flavomaculatus*, 269.
 rothschildi, 269.
 wheeleri, 269.
 var. *immaculatus*, 269.
Ceramioides, 267.
Ceramiopsis, 13.
Ceramius, 13, 21, **267**.
 beyeri, 267.
 bicolor, 267.
 caffer, 267.
 capensis, 267.
 capicola, 267.
 cerceriformis, 267.
 consobrinus, 267.
 fonscolombii, 267.
 fumipennis, 267.
 karrooensis, 267.
 lichtensteinii, 267, **268**.
 var. *macrocephalus*, 268.
 linearis, 268.
 macrocephalus, 268.
 nigripennis, 268.
 peringueyi, 268.
 rex, 268.
 rufomaculatus, 268.
 schulthessi, 268.
 vespiformis, 268.
cerceriformis, *Ceramius*, 267.
chagosensis, *Odynerus*, 313.
chapini, *Odynerus*, 6, 131, **188**, 189
 (Figs. 209-213), **295**.
Charterginus, 15, 229.
Chartergus, 15, 257.
chevrieanus, *Pterochilus phaleratus*
 var., 195 (ethology).
chloroticus, *Rhynchium*, 295.
chloroticus, *Odynerus*, 295.
Chrysis dubia, 269.
chrysomallum, *Rhynchium*, 295.
chrysomallus, *Odynerus*, 127, **295**.
chudeaui, *Labus*, 273.

- cincta*, *Epipona*, 247, 340.
Icaria, 340.
 Ropalidia, 247, 248 (ethology), 249, 250, **251**, 252 (Figs. 246–248), 338, **340**.
cinerea, *Vespa*, 334.
cingulifer, *Odynerus*, 315.
circinalis, *Eumenes maxillosus* var., 58, 59, 60, 63 (Fig. 48, distribution), 67 (ethology).
claripennis, *Belonogaster indicus* var., 333.
clavata, *Icaria*, 340.
 Ropalidia, 340.
Clypearia, 15, 229.
clypeata, *Synagris*, 201, 323.
Synagris huberti var., 126, 166, 224, **225**, 226, **323**.
Synagris huberti var., 323, 324.
clypeatus, *Belonogaster*, 329.
 Celonites, 269.
cnemophilus, *Odynerus*, 295.
coarctata, *Vespa*, 274.
coarctatus, *Eumenes*, 22, 55 (ethology), 86, 274.
cænocephalus, *Odynerus*, 313.
cæruleopennis, *Vespa*, 271.
 Zethus, 271.
cognatus, *Odynerus*, 315.
collega, *Odynerus*, 106.
colonialis, *Belonogaster*, 334.
combusta, *Synagris*, 221, 322.
combustus, *Odynerus*, 295.
concinnulus, *Odynerus*, 315.
concinnus, *Eumenes*, 277.
Eumenes lepeleterii var., 76, 77, **277**.
conformis, *Odynerus*, 106.
congensis, *Pachymenes*, 6, **88** (Figs. 74–79), 90, 265, **283**. Pl. I, Fig. 2.
congicus, *Odynerus cyanopterus* var., 6, 145, **146**, **296**.
congolensis, *Odynerus*, 6, 133, **176**, 177 (Figs. 193–197), **295**.
conicus, *Eumenes maxillosus* var., 58, 59, 60, 62 (Fig. 46, distribution), 67 (ethology).
conradii, *Odynerus*, 295.
consobrinus, *Ceramius*, 267.
constitutionalis, *Icaria*, 340.
Ropalidia, 340.
cornuta, *Apis*, 326.
Synagris, 6, 10, 11, 120, 125, 126, 133, 134, 197, 198 (Figs. 227–229, mouth parts), 199, 200, 201, 203, 204, 205 (Fig. 231), 206 (Figs. 232–233), 207 (key to varieties), **208**, 211 (ethology), 214, 216, 221, 222, 224, 226, 228, 229, 265, 318, **325**. Pl. II, Fig. 2.
Vespa, 208, 318, 325, 326.
Vespa crabro, 326.
cornuta var. *basalis*, *Synagris*, 208, **209**, 210, 226, 265, **326**. Pl. II, Fig. 5.
cornuta var. *didieri*, *Synagris*, 208, **209**, 211 (ethology), 265, **326**. Pl. II, Fig. 4.
cornuta var. *flavofasciata*, *Synagris*, 6, 199, 207, **210**, 213 (ethology), 265, **327**. Pl. II, Fig. 7.
cornuta var. *ituriensis*, *Synagris*, 6, 207, **209**, 265, **327**. Pl. II, Fig. 3.
cornuta var. *maculata*, *Synagris*, 6, 207, **210**, 265, **327**. Pl. II, Fig. 6.
cornuta var. *rufithorax*, *Synagris*, 6, 207, **208**, 209, 265, **327**. Pl. II, Fig. 1.
cornuta var. *similis*, *Synagris*, 6, 125, 204, 207, **210**, 265, **327**. Pl. II, Fig. 8.
cornuta var. *ugandæ*, *Synagris*, 326.
corvus, *Odynerus*, 192, **295**.
crabro, *Vespa*, 249.
crabro cornuta, *Vespa*, 326.
crabro microrrhæa, *Vespa*, 322.
crassicornis, *Ancistrocerus*, 112 (ethology).
crassinoda, *Noctonia*, 283.
crassinodus, *Eumenes*, 283.
Labus, 283.
Pachymenes, 283.
crassipes, *Synagris*, 125, 215, 218, **223**, **322**.
crenatus, *Odynerus*, 290.
cruciata, *Sphex*, 275.
crucigera, *Vespa*, 275.
Ctenochilus, 14.
curriei, *Micreumenes*, 44, 46, 47, 49, 273.
curvifolius, *Odynerus*, 283.

- curvurufolineatus, *Pachymenes*, 283.
cyanoptera, *Calligaster*, 31.
cyanopterum, *Rhynchium*, 296.
 Rygghium, 296.
cyanopterum var. *mossambicum*, *Rhynchium*, 296.
cyanopterus, *Odynerus*, 6, 129, 145, **146**, **296**, 301.
 Zethus, 31 (ethology).
cyanopterus var. *congicus*, *Odynerus*, 6, 145, **146**, **296**.
cyanopterus var. *mossambicus*, *Odynerus*, 146.
cyanopterus var. *sabulosus*, *Odynerus*, 129, 145, **146**, **296**.
cyanurum var. *amethystinum*, *Stilbum*, 66.
cylindricus, *Odynerus*, 310.

dantici, *Odynerus*, 182, 183, **296**.
 Vespa, 296.
dauensis, *Odynerus*, 296.
deceptor, *Odynerus*, 7, 127, 305.
decipiens, *Eumenes*, 282.
 Eumenes melanosomus var., 79 (Figs. 64-69), 81, **82**, 83, **282**.
decoratus, *Odynerus mirabilis* var., 145.
defectivus, *Polistes*, 346.
defractus, *Odynerus*, 296.
delagoensis, *Calligaster*, 271.
 Zethus, 31, 35, **271**.
democratica, *Icaria*, 340.
 Ropalidia, 340.
dentata, *Synagris*, 325.
denticulata, *Synagris*, 297.
denticulatum, *Rhynchium*, 297.
denticulatus, *Odynerus*, 297.
desperatus, *Odynerus*, 6, 132, **166**, 167 (Figs. 178-182), 171, 172, 174, 176, **297**.
determinatus, *Odynerus*, 297.
didieri, *Synagris*, 326.
 Synagris cornuta var., 208, **209**, 211 (ethology), 265, **326**. Pl. II, Fig. 4.
Didymogastra, 14, 30, 31, 32, 36.
 geniculata, 32.
 romandina, 32.
difformis, *Labus*, 286.

Nortonia, 286.
Odynerus, 286.
dilecta, *Quartinia*, 270.
dilectulus, *Eumenes*, 276.
dimidiatipennis, *Eumenes*, 280.
 Eumenes maxillosus var., 59, 60, 62 (Fig. 47, distribution), 64, 67 (ethology), **280**.
dimidiatum, *Rhynchium*, 297.
dimidiatus, *Odynerus*, 297.
dimorphus, *Odynerus*, 297.
Discoelius, 14, 43, 45.
 transvaalensis, 35, 271.
discrepans, *Masaris*, 266.
disjunctus, *Odynerus*, 315.
distigma, *Icaria*, 341.
 Ropalidia, 338, 340, **341**.
distinctus, *Eumenes*, 282.
 Eumenes melanosomus var., 81, 82, **84**, **282**.
distinguendus, *Belonogaster*, 234, 329.
diversus, *Odynerus*, 315.
dives, *Pterochilus*, 317.
dohertyi, *Odynerus hæmorrhoidalis* var., 145.
dorycus, *Eumenes*, 55 (ethology).
Dorylus nigricans, 238.
dotatus, *Odynerus*, 315.
dubia, *Chrysis*, 269.
 Icaria, 341.
 Ropalidia, 341.
 Synagris, 321.
dubius, *Belonogaster*, 234, 235, **237** (ethology), 265, **330**. Pl. VI, Figs. 1 and 2.
ducalis, *Icaria*, 341.
 Ropalidia, 341.
dunbrodyensis, *Odynerus*, 297.
dyschera, *Eumenes*, 275.
dyscheroides, *Eumenes*, 278.
 Eumenes lepelletieri var., 278.
dyscherus, *Eumenes caffer* var., 65, 71, **74**, **275**.

Ectopioglossa, 14.
elegans, *Belonogaster*, 335.
 Belonogaster lateritius var., 334.
 Eumenes, 276.
elephas, *Synagris*, 125, **323**.

- Elimus, 14, 21, 24, 26, 35, 41, 42, 43, 45, **271**.
 arabicus, 271.
 australis, 271.
 ellenbergi, Polistes, 346.
 emarginata, *Synagris*, 320.
Synagris abyssinica var., 196, **222**, **320**.
 Emenadia, 72.
 emeryanum, *Rhynchium*, 301.
 emeryanus, Odynerus, 127, 133, **162**, **297**.
Epancistrocerus, 113.
 Epipona, 15, 290.
 cincta, 247, 340.
Epipone, 290.
 Epiponinae, 15, 22, 23, **230**, **328**.
erythraspis, *Eumenes*, 282.
erythrinum, *Rhynchium*, 297.
 erythrinus, Odynerus, 297.
erythrospila, *Eumenes*, 280.
erythrospilus, *Belonogaster*, 332.
 Odynerus, 302.
 erythrotomus, Odynerus, 297.
esuriens, *Eumenes*, 275.
 Eumenes caffer var., 70, 71, 72 (ethology), **73**, **275**.
 Vespa, 275.
esuriens var. *gracilis*, *Eumenes*, 276.
Euchalcomenes, 87, 283.
Eudiscælius, 87, 283.
 Eumenes, 6, 10, 14, 21, 22, 23, 24, 26, 27, 42, 44, **54**, 55 (ethology), 56 (key to species), 60, 87, 91, 92, 93, 94, 109, 120, 122, **274**.
 acuminatus, 86, **274**.
 æthiopica, 281.
 alluaudi, 277.
 arbustorum, 55 (ethology), **275**.
 arcuatus, 60.
 artifex, 274.
 asina, 277.
 aterrima, 282.
 belfragei, 55 (ethology).
 bicinctus, 60, 65.
 bisignatus, 275.
 bollii, 55 (ethology).
 braunsianus, 86, **275**.
 caffer, 10, 24, 55 (ethology), 56, 60, 65, **69**, 70 (Figs. 50-55), 71 (key to varieties; Fig. 56, distribution), **72** (ethology), **275**, 276.
 var. *dyscherus*, 65, 71, **74**, **275**.
 var. *esuriens*, 70, 71, 72 (ethology), **73**, **275**.
 var. *gracilis*, 71, **72**, **275**.
cameruna, 278.
canaliculatus, 55 (ethology).
capensis, 86, **276**.
coarctatus, 22, 55 (ethology), 86, 274.
concinus, 277.
crassinodus, 283.
decipiens, 282.
dilectulus, 276.
dimidiatipennis, 280.
distinctus, 282.
dorycus, 55 (ethology).
dyschera, 275.
dyscheroides, 278.
elegans, 276.
erythraspis, 282.
erythrospila, 280.
esuriens, 275.
 var. *gracilis*, 276.
femoratus, 86, 276.
fenestralis, 280.
fenestratus, 280.
formosa, 71, 72, 275.
 var. *lepeletieri*, 276.
fraternus, 55 (ethology).
füllebornianus, 86, **276**.
germaini, 55 (ethology).
gracilis, 276.
gracillima, 282.
granti, 77, 78, 277.
guerini, 277.
higletti, 276.
hottentotta, 278.
janseii, 277.
kohli, 281.
laminata, 91.
langi, 6, 56, **84**, 85 (Figs. 71-73), **276**.
latreillei, 67, 281.
lepeletieri, 56, 60, 65, 69, 70, 71, 72, **74**, 75 (Figs. 57-62), 76 (key to varieties; Fig. 63, distribution), **77**, 81, **276**.
 var. *alluaudi*, 76, **277**.

- var. *asinus*, 76, 77, **277**.
 var. *concinus*, 76, 77, **277**.
 var. *guerini*, 76, 77, **277**.
 var. *hottentottus*, 65, 74, 75 (Figs. 57-62), 77, **78, 278**.
 var. *pensilis*, 76, 77, **278**.
 var. *stuhlmanni*, 77, **78, 278**.
 var. *tessmanni*, 65, 76, 77, **278**.
lepetetieri, 276.
lepetetieri var. *dyscheroides*, 278.
 var. *sakalavus*, 278.
leptogaster, 278.
longirostris, 282.
lucasius, 60, 86, **278**.
macrocephala, 275.
maculinodus, **278, 283**.
maxillosus, 10, 24, 55 (ethology), **56**, 57 (Figs. 39-43), 58 (key to varieties), 59, 60, 61 (Figs. 44 and 45, distribution), 64, 65-**67** and 68 (ethology), 70, 72, 74, 75, 77, 78, 83, 120, 265, **279**.
 var. *circinalis*, 58, 59, 60, 63 (Fig. 48, distribution), 67 (ethology).
 var. *conicus*, 58, 59, 60, 62 (Fig. 46, distribution), 67 (ethology).
 var. *dimidiatipennis*, 59, 60, 62 (Fig. 47, distribution), 64, 67 (ethology), **280**.
 var. *fenestralis*, 59, 62 (Fig. 46, distribution), 64, 65, **68, 69, 280**.
 var. *ferrugineus*, 58.
 var. *petiolatus*, 58, 59, 60, 63 (Fig. 49, distribution), 65, 67 (ethology), **281**.
 var. *pulcherrimus*, 59, 63 (Fig. 49, distribution), 64, 65, **281**.
 var. *reginus*, 58, 62 (Fig. 47, distribution), 64, 67 (ethology), **281**.
 var. *tropicalis*, 59, 63 (Fig. 48, distribution), 64, 65, **69, 265, 281**. Pl. I, Fig. 3.
 var. *xanthurus*, 58, 59, 60, 61 (Fig. 45, distribution), 67.
melanosomus 54, 56, 60, 65, **79** (Figs. 64-69), 80 (Fig. 70, distribution), 81 (key to varieties), **82, 281**.
 var. *æthiopicus*, 65, 81, **84, 281**.
 var. *affinis*, 81, **282**.
 var. *aterrimus*, 54, 65, 81, **82, 282**.
 var. *decipiens*, 79 (Figs. 64-69), 81, **82, 83, 282**.
 var. *distinctus*, 81, 82, **84, 282**.
 var. *longirostris*, 81, **83, 282**.
meruensis, 277.
moseri, 79, 282.
ornativentris, 279, **282**.
pensilis, 278.
peringyanus, 86, **283**.
perplexus, 274.
petiolata, 281.
phthisicus, 283.
pulchripennis, 276.
quadrispinosus, 271.
regina, 281.
rendalli, 283.
rufolineatus, 283.
sakalava, 77, 277.
sanguinolenta, 277.
sansibarica, 271.
saundersii, 58, 67.
savignyi, 279.
schultzeanus, 278.
signaticornis, 283.
signicornis, 283.
smithii, 55 (ethology).
spilocera, 277.
sulcigaster, 86, **283**.
tinctor, 67, 279.
tropica, 281.
tropicalis, 281.
unguiculus, 55 (ethology).
variventris, 281.
walkeri, 282.
xanthaspis, 282.
Eumenidion, 55, 86.
Eumeninæ, 14, 22, **54, 274**.
eumenoides, *Belonogaster*, 330.
Nortonia, 284.
Odynerus, 284.
Pachymenes, 284.
Raphiglossa, 30 (ethology), 270.
Euparagia, 13.
Euparagiinæ, 13, 22, 23.
Eupolistes, 255.
europæum, *Ryggchium*, 121, 292, 307.

- euryopilus*, *Odynerus*, 297.
eurystomus, *Pterochilus*, 317.
Pterochilus, 317.
eversmanni, *Odynerus*, 290.
Oplopus, 291.
exiguus, *Leptochilus*, 298.
Odynerus, 298.
exustus, *Odynerus*, 315.

facialis, *Belonogaster*, 330.
falcatus, *Odynerus*, 123 (ethology), 131, **179**, **298**.
fallax, *Odynerus*, 125, **298**.
Rhynchium, 298.
farquharensis, *Odynerus*, 298.
fasciata, *Synagris*, 323.
fastidiosissimus, *Odynerus*, 298.
fastidiosus, *Odynerus*, 296.
Polistes, 256, 257, 258, 259, **260**
(Figs. 255-257), 265, **346**.
fastidiosus var. *sikoræ*, *Polistes*, 256, 259,
260, 261, **346**.
favillaceus, *Zethus*, 271.
femoratus, *Eumenes*, 86, **276**.
fenestralis, *Eumenes*, 280.
Eumenes maxillosus var., 59, 62
(Fig. 46, distribution), 64, 65, **68**,
69, **280**.
fenestratus, *Eumenes*, 280.
ferox, *Synagris*, 325.
ferruginatus, *Odynerus*, **7**, 127, 229,
298.
ferruginea, *Ropalidia*, 247.
ferrugineum, *Rhynchium*, 181, 298.
ferrugineum var. *flabellatum*, *Macrosia-*
gon (Emenadia), 220, 222.
ferrugineus, *Eumenes* maxillosus var., 58.
Odynerus, 298.
Odynerus, 127, 298.
Stenodynerus, **7**, 229, 298.
ferrugineus var. *mafiensis*, *Stenodynerus*,
229, 328.
ferruginosus, *Odynerus*, 291.
fervens, *Odynerus*, 298.
Rhynchium, 298.
fervida, *Synagris*, 319.
fervidus, *Odynerus*, 299.
filiformis, *Belonogaster*, 330.
Raphigaster, 330.
Raphiglossa, 271.
filiventris, *Belonogaster*, 236, **331**.
Raphigaster, 331.
finitimus, *Labus*, 284.
Pachymenes, 284.
fischeri, *Celonites*, 269.
flabellatum, *Macrosiagon* (Emenadia)
ferrugineum var., 220, 222.
flavipennis, *Polistes*, 346.
flavipes, *Osprynchotus*, 211.
flavobilineata, *Icaria*, 255.
Polistes, 255.
flavofasciata, *Synagris* **cornuta** var.,
6, 199, 207, **210**, 213 (ethology), 265,
327. Pl. II, Fig. 7.
flavomaculata, *Synagris*, 202, 327.
flavomaculatus, *Celonites* *purcelli* var.,
269.
flavo-ornata, *Raphiglossa*, 29 (ethology),
30, **270**.
Rhaphidoglossa, 270.
Rhaphiglossa, 270.
flavopicta, *Icaria*, 246.
Ropalidia, 246, 247.
flavus, *Ischnogasteroides*, 272.
Odynerus, 316.
fleckii, *Belonogaster*, 334.
floricola, *Labus*, 42, **273**.
Odynerus, 128.
fonscolombii, *Ceramius*, 267.
foraminosum, *Rhynchium*, 299.
foraminosus, *Odynerus*, 299.
formosa, *Eumenes*, 71, 72, 275.
formosa var. *lepeletieri*, *Eumenes*, 276.
forticulum, *Rhynchium*, 299.
forticulus, *Odynerus*, 125, 153, 159, **299**.
fragilis, *Labus*, 49, 273.
fragosa, *Nortonia*, 97, **107**, **286**.
fraterculus, *Labus*, 284.
Pachymenes, 284.
fraterna, *Icaria*, 341.
Ropalidia, 341.
fraternus, *Eumenes*, 55 (ethology).
frendens, *Odynerus*, 299.
freyi, *Belonogaster*, 331.
füllebornianus, *Eumenes*, 86, **276**.
fulva, *Synagris*, 203, **327**.
fulva var. *trispinosa*, *Synagris*, 327.
fulvipes, *Ancistrocerus*, 106.

- fulvipennis*, *Belonogaster*, 332.
fumipennis, *Ceramius*, 267.
Odynerus, 316.
furax, *Rhynchium*, 181, 303.
Rygchium, 143.
fuscatus, *Polistes*, 253.
fuscipennis, *Belonogaster griseus* var., 332.
Rhynchalastor, 127, 229, **328**.

galimatia, *Icaria*, 341.
Ropalidia, 341.
galimatia var. *ignobilis*, *Ropalidia*, 341.
gallica, *Vespa*, 345.
gallicus, *Polistes*, 253, 254 (Fig. 249), 256, 257 (ethology), 258, 262, 345.
gambiensis, *Labus*, 99, 286.
Odynerus, 299.
Nortonia, 99, **286**.
garambensis, *Labus*, 6, 45, **51**, 52 (Figs. 32-38), 54, **273**.
Gayella, 13.
geniculata, *Didymogastra*, 32.
geniculatus, *Zethus*, 32 (ethology).
germaini, *Eumenes*, 55 (ethology).
germanica, *Vespa*, 206.
gestroi, *Odynerus*, 127, 143, **291**.
Rhynchium, 291.
Rygchium, 291.
gigas, *Zethus*, 31.
glabripalpis, *Pseudochilus*, 27, 87, **285**.
Pterochilus, 87, 285.
Gnatho, 267.
lichtensteinii, 268.
goniodes, *Odynerus*, 127, **299**.
gonioides, *Odynerus*, 299.
gowdeyanus, *Ancistrocerus*, 287.
Odynerus, 287.
gracilis, *Belonogaster*, 331.
Eumenes, 276.
Eumenes caffer var., 71, **72**, **275**.
Eumenes esuriens var., 276.
Labus, 54, **273**.
gracillima, *Eumenes*, 282.
grandidieri, *Icaria*, 342.
Odynerus, 299.
Ropalidia, 247, **342**.
granti, *Eumenes*, 77, 78, 277.
grayi, *Odynerus*, 299.

Rhynchium, 299.
grayi var. *neavei*, *Odynerus*, 299.
Rhynchium, 299.
grayi var. *sumptuosum*, *Rhynchium*, 299.
grayi var. *sumptuosus*, *Odynerus*, 299.
grayi var. *thomsoni*, *Odynerus*, 299.
grayi var. *usambaraense*, *Rhynchium*, 300.
grayi var. *usambaraensis*, *Odynerus*, 300.
gregaria, *Icaria*, 246.
Gribodia, 14.
grisea, *Vespa*, 331.
griseus, *Belonogaster*, 234, 236, **237**, **331**.
griseus var. *fuscipennis*, *Belonogaster*, 332.
griseus var. *menelikii*, *Belonogaster*, 332.
griseus var. *pallens*, *Belonogaster*, 332.
grossepunctata, *Icaria*, 284.
gueinzii, *Atractodes*, 221.
guerini, *Belonogaster*, 332.
Eumenes, 277.
Eumenes lepeleterii var., 76, 77, **277**.
Raphigaster, 333.
guerinii, *Odynerus*, 127, **300**.
guineensis, *Odynerus*, 127, **300**.
Raphigaster, 231, 334.
Vespa, 280.
Zethus, 280.
guttatipennis, *Icaria*, 342.
Ropalidia, 247, 248 (ethology), 249, **250**, 251 (Figs. 243-245), 265, 339, **342**, 343. Pl. I, Fig. 11.
guttulosus, *Odynerus*, 316.
Gymnopolybia, 16, 245.
Gyrostoma, 17.
orientalis, 255.
schach, 255.
gyrostoma, *Polistes*, 255.

hæmorrhoidale, *Rhynchium*, 300.
Rygchium, 300.
hæmorrhoidale var. *brunneum*, *Rhynchium*, 301.
hæmorrhoidale var. *quinquecinctum*, *Rhynchium*, 301.
hæmorrhoidalis, *Odynerus*, 24, 60, 145, **300**.
Vespa, 300.
hæmorrhoidalis var. *ater*, *Odynerus*, 145.

- hæmorrhoidalis* var. *carnaticus*, Odynerus, 145.
hæmorrhoidalis var. *dohertyi*, Odynerus, 145.
hæmorrhoidalis var. *künckeli*, Odynerus, 145.
hæmorrhoidalis var. *medius*, Odynerus, 145.
hæmorrhoidalis var. *parentissimus*, Odynerus, 145.
hæmorrhoidalis var. *quinquecinctus*, Odynerus, 145, **300**.
hæmorrhoidalis var. *rubropictus*, Odynerus, 145.
hæmorrhoidalis var. *salomonis*, Odynerus, 145.
hæmorrhoidalis var. *sanguineus*, Odynerus, 145.
hansi, Odynerus, 301.
harrarensis, Odynerus, 178, **301**.
haugi, Polistes, 257, 259, **261**, **346**.
hebræa, *Vespa*, 347.
hebræus, Polistes, 347.
Polistes, 346.
Hemipterochilus, 194.
hero, *Calligaster*, 31.
Heros, 14, 30, 31.
heros, *Osprynchotus*, 211.
herrichii, Odynerus, 290.
heydeniana, *Nortonia*, 107, 285, **286**.
Synagris, 218, 321.
heydenianus, Odynerus, 107, 286.
higletti, *Eumenes*, 276.
hildebrandti, *Belonogaster*, 232, **333**.
Odynerus, 301.
histrionicum, *Rhynchium*, 301.
histrionicus, Odynerus, 192, **301**.
***histrionimimus*, Odynerus**, 6, 130, **190**
(Figs. 214–220), **301**.
holomelas, Odynerus, 125, **301**.
Rhynchium, 301.
holosericeum, *Rhynchium*, 301.
holosericeus, Odynerus, 301.
Hoplomerus, 124, 290.
Hoplopus, 290.
hottentotta, *Eumenes*, 278.
hottentottus, *Eumenes lepeleteri* var.,
65, 74, 75 (Figs. 57–62), 77, **78**,
278.
hottentottus, Odynerus, 123 (ethology),
168, 169, 170, 172, 178, **301**.
hova, *Icaria*, 342.
Odynerus, 302.
Ropalidia, 247, **342**.
hova var. *minor*, *Icaria*, 342.
Ropalidia, 342.
huberti, *Synagris*, 126, 166, 214, 215,
217, **224**, 226, **323**.
huberti var. *bimaculata*, *Synagris*, 224,
226, **323**.
huberti var. *clypeata*, *Synagris*, 126, 166,
224, **225**, 226, **323**.
huberti var. *clypeata*, *Synagris*, 323, 324.
huberti var. *nigricans*, *Synagris*, 224,
323.
humbei, Odynerus, 316.
humbertianus, *Labus*, 42.
hyacinthæ, Odynerus, 123 (ethology), 127,
129, **160** (Figs. 169–173), 162 (etho-
logy), 163, 164, **302**.
hyacinthæ, Odynerus, 302.
Hymenosmithia, 44, 273.
natalensis, 274.
Hypagris, 319.
Hypoaspis, 105.
Icaria, 16, 244, 245, 246, 338.
æthiopica, 338.
africana, 338.
ambigua, 338.
anarchica, 339.
antennata, 339.
aterrima, 305.
atra, 339.
australis, 247.
bicincta, 339.
brazzai, 339.
capensis, 339.
carinata, 339.
cariniscutis, 339.
cincta, 340.
clavata, 340.
constitutionalis, 340.
democratica, 340.
distigma, 341.
dubia, 341.
ducalis, 341.
flavobilineata, 255.

- Icaria flavopicta*, 246.
fraterna, 341.
galimatia, 341.
grandidieri, 342.
gregaria, 246.
grossepunctata, 284.
guttatipennis, 342.
hova, 342.
 var. *minor*, 342.
ignobilis, 341.
interjecta, 342.
irrequieta, 342.
maculata, 343.
madecassa, 341.
nigrofemorata, 343.
nitidula, 343.
nobilis, 343.
phalansterica, 246, 343.
politica, 342.
pomicolor, 343.
prasina, 343.
pulchella, 343.
ranavali, 344.
regina, 344.
sakalava, 344.
schulthessi, 344.
scottiana, 344.
socialistica, 247.
subclavata, 344.
tomentosa, 344.
tricinctella, 251, 340.
variabilis, 344.
velutina, 345.
venustula, 345.
vitripennis, 345.
xanthura, 340, 345.
Icariastrum, 246.
Icarielia, 246, 247.
Icariola, 246.
ignaruris, Odynerus, 302.
ignobilis, *Icaria*, 341.
 Ropalidia galimatia var., 341.
imbecillus, Ancistrocerus, 117, 288.
 Odynerus, 111, 288.
imitator, *Rhynchium*, 324.
 Synagris, 226, 324.
immaculatus, *Celonites wheeleri* var., 269.
impunctatus, Ancistrocerus, 288.
 Odynerus, 288.
 incensum, *Rhynchium*, 302.
incensus, Odynerus, 125, 302.
incertus, *Polistes*, 348.
inconstans, Ancistrocerus, 288.
 Odynerus, 288.
indecorus, Odynerus, 302.
indica, *Polybia*, 238.
indicus, Belonogaster, 230, 333.
 Raphigaster, 333.
indicus var. *claripennis*, Belonogaster, 333.
inermis, *Rhynchium*, 302.
inermis var. *atratum*, *Rhynchium*, 302.
inermis, Odynerus, 126, 302.
 Synagris, 302.
inermis var. *atrata*, *Synagris*, 302.
inermis var. *atratus*, Odynerus, 302.
inornatus, Odynerus, 316.
 Polistes, 348, 349.
 Polistes marginalis var., 348.
insignis, Odynerus, 317.
 Pterochilus, 317.
instabilis, Odynerus, 316.
interjecta, *Icaria*, 342.
 Ropalidia, 342.
intermedia, *Nortonia*, 91, 92, 93, 94, 285.
 Synagris, 321.
intermedius, Odynerus, 91, 93, 94, 285.
interruptus, Odynerus, 309.
invisus, Odynerus, 287.
irina, *Synceca*, 241.
irrequieta, *Icaria*, 342.
 Ropalidia, 342.
isabellina, *Parapolybia tabida* var., 338.
 Polybioides tabida var., 240, 338.
Ischnocelia, 14.
Ischnogaster, 15.
Ischnogasterinæ, 35.
Ischnogasteroides, 14, 21, 24, 26, 35, 36, 272.
 flavus, 272.
iterabilis, *Pterochilus*, 317.
 Pterochilus, 317.
iturienis, *Synagris cornuta* var., 6, 207, 209, 265, 327. Pl. II, Fig. 3.
janseii, *Eumenes*, 277.

- jousseausei*, Celonites, 269.
jucosus, Odynerus, 302.
Jugurthia, 269.
Jugurtia, 13, 21, **269**.
 oraniensis, 269.
 simpsoni, 270.
Jugurtha, 269.
juncea, *Vespa*, 328, 334.
junceus, *Belonogaster*, 231 (ethology),
 234, **236**, 237, 265, 328, **333**. Pl. I,
 Fig. 9.
 Raphigaster, 329, 334.
junodi, Odynerus, 126, **302**, 303.
 Rhynchium, 302.
junodianum, *Rhynchium*, 302.
junodianus, Odynerus, 125, **302**.
jurinei, *Zethus*, 31.

kabarensis, *Odynerus*, 6, 131, 184,
 186, 187 (Figs. 203–208), 188, 189,
 303.
karibæ, Odynerus, 303.
karroensis, *Ceramius*, 267.
Katamenes, 14.
katonai, Odynerus, 303.
kelidopterum, *Rhynchium*, 303.
kelidopterus, Odynerus, 303.
kibonotensis, *Nortonia*, 286.
 Odynerus, 286.
kibonotoensis, *Nortonia*, 286.
kilimandjaroensis, Odynerus, 303.
kisangani, *Ancistrocerus*, 6, 105, 106,
 111, 113, 114, **115** (Figs. 108–110),
 265, **288**. Pl. I, Fig. 8.
kloofensis, Odynerus, 303.
kohli, *Belonogaster*, 331.
 Eumenes, 281.
 Synagris, 125, 215, 218, **219**, **323**.
Koptortosoma, 105.
kristenseni, Odynerus, 303.
künckeli, Odynerus *hæmorrhoidalis* var.,
 145.

labiatus, *Mischocyttarus*, 231.
Laboides, 14, 30, 43, 44.
Labus, 6, 14, 21, 23, 24, 26, **41**, 45 (key
 to species), 94, **272**.
 adelphus, 273.
 annulatus, 273.

 annulipes, 49, **273**.
 armatus, 273.
 astutus, 283.
 bisuturalis, 286.
 brasiliensis, 44.
 caffra, 286.
 chudeaui, 273.
 crassinodus, 283.
 difformis, 286.
 finitimus, 284.
 floricola, 42, **273**.
 fragilis, 49, 273.
 fraterculus, 284.
 gambiensis, 99, 286.
garambensis, 6, 45, **51**, 52 (Figs. 32–
 38), 54, **273**.
 gracilis, 54, **273**.
 humbertianus, 42.
 macrostylus, 44, **46**, 47 (Figs. 13–25),
 49, 50, 51, 53, **273**.
 maculicollis, 45, **49**, 50 (Figs. 26–31),
 51, **273**.
 madecassus, 274.
 maindroni, 274.
 natalensis, 274.
 nigrilus, 284.
 rothschildanus, 274.
 rufipes, 274.
 rufipetiolatus, 274.
 sichelianus, 42, 43, 44.
 socotræ, 284.
 spiniger, 42, 45, 273.
 superbus, 274.
 swalei, 274.
 transiens, 285.
lacuum, Odynerus, 126, 302, **303**.
 Paramischocyttarus, 36, **272**.
 Rhynchium, 303.
lævis, *Nortonia*, 284.
 Pachymenes, 284.
laminata, *Eumenes*, 91.
langi, *Eumenes*, 6, 56, **84**, 85 (Figs.
 71–73), **276**.
laterale, *Rhynchium*, 304.
 Ryngchium, 305.
lateralis, Odynerus, 6, 127, 131, 132, 134,
 143, 179, **180**, **181** (key to varieties),
 182, **303**.
 Vespa, 181, 303.

- lateralis** var. **lateropictus**, *Odynerus*; 6, 181, 303.
- lateralis* var. *unicolor*, *Odynerus*, 181, 303.
- lateritius*, *Belonogaster*, 234, 235, 238 (ethology), 334.
- lateritius* var. *agilis*, *Belonogaster*, 334.
- lateritius* var. *elegans*, *Belonogaster*, 334.
- lateropictus**, *Odynerus* **lateralis** var., 6, 181, 303.
- latreillei*, *Eumenes*, 67, 281.
- lefebvrei*, *Odynerus* *oculatus* var., 145.
- Leionotus*, 91, 123, 124, 197, 292.
- Leipomeles*, 15.
- leonhardii*, *Belonogaster*, 335.
- lepeleterii*, *Eumenes*, 56, 60, 65, 69, 70, 71, 72, 74, 75 (Figs. 57-62), 76 (key to varieties; Fig. 63, distribution), 77, 81, 276.
- lepeleterii* var. *alluaudi*, *Eumenes*, 76, 277.
- lepeleterii* var. *asinus*, *Eumenes*, 76, 77, 277.
- lepeleterii* var. *concinnus*, *Eumenes*, 76, 77, 277.
- lepeleterii* var. *guerini*, *Eumenes*, 76, 77, 277.
- lepeleterii* var. *hottentottus*, *Eumenes*, 65, 74, 75 (Figs. 57-62), 77, 78, 278.
- lepeleterii* var. *pensilis*, *Eumenes*, 76, 77, 278.
- lepeleterii* var. *stuhlmanni*, *Eumenes*, 77, 78, 278.
- lepeleterii* var. *tessmanni*, *Eumenes*, 65, 76, 77, 278.
- lepeletieri*, *Eumenes*, 276.
- Eumenes* *formosa* var., 276.
- lepeletieri* var. *dyscheroides*, *Eumenes*, 278.
- lepeletieri* var. *sakalavus*, *Eumenes*, 278.
- Leptochilus*, 292.
- exiguus*, 298.
- parvulus*, 287.
- leptogaster*, *Eumenes*, 278.
- lichtensteinii*, *Ceramius*, 267, 268.
- Gnatho*, 268.
- lichtensteinii* var. *macrocephalus*, *Ceramius*, 268.
- limbatus*, *Odynerus*, 290.
- linearis*, *Belonogaster*, 331.
- Ceramius*, 268.
- Vespa*, 331.
- lineaticollis*, *Ancistrocerus*, 120, 288.
- Odynerus*, 288.
- lineaticollis* var. *rufopictus*, *Ancistrocerus*, 288.
- Odynerus*, 288.
- Lionotus*, 124.
- lobulatus*, *Zethus*, 32 (ethology), 212.
- Zethusculus*, 32.
- longirostris*, *Eumenes*, 282.
- Eumenes* *melanosomus* var., 81, 83, 282.
- longistylus*, *Belonogaster*, 335.
- longstaffi*, *Odynerus*, 312.
- lucasi*, *Eumenes*, 60, 86, 278.
- lucida*, *Alastor*, 328.
- luctuosum*, *Rhynchium*, 304.
- luctuosus*, *Odynerus*, 125, 304.
- lufiræ*, *Ancistrocerus*, 113, 114, 288.
- Odynerus*, 288.
- lugubris*, *Odynerus*, 125, 181, 304.
- luteopicta*, *Synagris* *vicaria* var., 125, 227, 319.
- macaensis*, *Polistes*, 25, 346.
- Vespa*, 346.
- macilenta*, *Vespa*, 331.
- macilentus*, *Belonogaster*, 331.
- Macrocalymma*, 14.
- macrocephala*, *Eumenes*, 275.
- macrocephalus*, *Ceramius*, 268.
- Ceramius* *lichtensteinii* var., 268.
- Odynerus*, 178, 304.
- Polistes**, 6, 257, 258, 261, 262 (Figs. 260-262), 347.
- Macrosiagon* (Emenadia) *ferrugineum* var. *flabellatum*, 220, 222.
- macrostylus*, *Labus*, 44, 46, 47 (Figs. 13-25), 49, 50, 51, 53, 273.
- maculata*, *Icaria*, 343.
- Ropalidia*, 342.
- Synagris** *cornuta* var., 6, 207, 210, 265, 327. Pl. II, Fig. 6.
- Synagris* *similis* var., 202, 204, 210, 327.
- maculatus*, *Odynerus* *spiniger* var., 291.

- maculicollis*, Labus, 45, **49**, 50 (Figs. 26-31), 51, **273**.
maculinodus, Eumenes, **278**, 283.
maculipennis, Polistes, 347.
maculiscapa, Nortonia, 286.
maculiscapus, Odynerus, 286.
maculiventris, Rhopalidia, 245.
 Ropalidia, 244, 245, 246, 247, 338.
madecassa, Icaria, 341.
madecasse, Rygchium, 304.
madecassis, Odynerus, 125, **304**.
madecassum, Rhynchium, 304.
madecassus, Belonogaster, 335.
 Labus, 274.
 Polistes, 255, 256, 257, 259, **347**.
 Raphigaster, 335.
madegasse, Rhynchium, 304.
mafiensis, Stenodynerus ferrugineus var., 229, 328.
magretti, Odynerus, 125, 153, **304**.
maindroni, Labus, 274.
major, Pterochilus, 317.
malagassus, Belonogaster var., 329.
 Belonogaster, 335.
 Odynerus, 304.
malelensis, Nortonia, 6, 95, **109**, 110 (Figs. 101-106), **286**.
mandibularis, Synagris, 221, 322.
manillensis, Polistes, 255.
marginalis, Polistes, 257, 258, 262, **263** (Figs. 263-265), 264, **347**.
 Vespa, 348.
marginalis var. *africanus*, Polistes, 348.
marginalis var. *inornatus*, Polistes, 348.
marginalis var. *plebejus*, Polistes, 348.
marginalis var. *stigma*, Polistes, 348.
marginella, *Vespa*, 304.
marginellum, Rhynchium, 145, 304.
marginellus, Odynerus, 123 (ethology), 127, 129, 134, **143** (Figs. 134-135), 145 (ethology), 146, 148, 181, **304**.
marginifasciatus, Odynerus *shelfi* var., 6, **176**, **310**.
marginipunctatus, Odynerus, 305.
marginiscutis, Odynerus, 305.
 Rhynchium, 305.
marshalli, Pareumenes, 272.
Masariella, 13, 21, 24, **266**.
 alfkeni, 266.
Masarinæ, 13, 22, 23, **266**.
Masaris, 13, 21, **266**.
 alfkeni, 266.
 apiformis, 269.
 discrepans, 266.
 saussurei, 266.
 spinolæ, 266.
 vespiformis, 266.
massaicus, Ancistrocerus, 113, **114** (Fig. 107), 117, **288**.
 Belonogaster, 330.
 Odynerus, 288.
massanensis, Ancistrocerus, **288**, 289.
 Odynerus, 288.
massauensis, Odynerus, 288.
mauritanicus, Odynerus, 290.
maxillosa, Synagris, 125, **323**.
 Vespa, 279.
maxillosus, Eumenes, 10, 24, 55 (ethology), **56**, 57 (Figs. 39-43), 58 (key to varieties), 59, 60, 61 (Figs. 44 and 45, distribution), 64, 65-**67** and 68 (ethology), 70, 72, 74, 75, 77, 78, 83, 120, 265, **279**.
maxillosus var. *circinalis*, Eumenes, 58, 59, 60, 63 (Fig. 48, distribution), 67 (ethology).
maxillosus var. *conicus*, Eumenes, 58, 59, 60, 62 (Fig. 46, distribution), 67 (ethology).
maxillosus var. *dimidiatipennis*, Eumenes, 59, 60, 62 (Fig. 47, distribution), 64, 67 (ethology), **280**.
maxillosus var. *fenestralis*, Eumenes, 59, 62 (Fig. 46, distribution), 64, 65, **68**, 69, **280**.
maxillosus var. *ferrugineus*, Eumenes, 58.
maxillosus var. *petiolatus*, Eumenes, 58, 59, 60, 63 (Fig. 49, distribution), 65, 67 (ethology), **281**.
maxillosus var. *pulcherrimus*, Eumenes, 59, 63 (Fig. 49, distribution), 64, 65, **281**.
maxillosus var. *reginus*, Eumenes, 58, 62 (Fig. 47, distribution), 64, 67 (ethology), **281**.
maxillosus var. *tropicalis*, Eumenes, 59, 63 (Fig. 48, distribution), 64, 65, **69**, 265, **281**. Pl. I, Fig. 3.

- maxillosus var. xanthurus, Eumenes, 58, 59, 60, 61 (Fig. 45, distribution), 67.
- Mazaris*, 266.
- meade-waldoi**, *Odynerus*, 7, 127, **305**.
Synagris versicolor var., 126, 228, **318**.
- medius, *Odynerus hæmorrhoidalis* var., 145.
- melaina*, *Parapolybia tabida* var., 337.
Polybia, 337.
Polybioides, 239, 240 (Fig. 239), **242**, 243 (ethology), 244, 265, **337**. Pl. V, Figs. 1 and 2.
Polybioides tabida var., 337.
- melanchrous, *Odynerus*, 125, **305**.
- melanodontus, *Odynerus*, 305.
- melanosomus, Eumenes, 54, 56, 60, 65, **79**, (Figs. 64-69), 80 (Fig. 70, distribution), 81 (key to varieties), **82**, **281**.
- melanosomus var. æthiopicus, Eumenes, 65, 81, **84**, **281**.
- melanosomus var. affinis, Eumenes, 81, **282**.
- melanosomus var. aterrimus, Eumenes, 54, 65, 81, **82**, **282**.
- melanosomus var. decipiens, Eumenes, 79 (Figs. 64-69), 81, **82**, 83, **282**.
- melanosomus var. distinctus, Eumenes, 81, 82, **84**, **282**.
- melanosomus var. longirostris, Eumenes, 81, **83**, **282**.
- melanus, *Odynerus*, 305.
- menelikii*, *Belonogaster*, 332.
Belonogaster griseus var., 332.
- mephisto, *Odynerus*, 126, **305**.
Rhynchium, 305.
Rygius, 305.
- meridionalis, *Odynerus*, 305.
- meruensis*, Eumenes, 277.
Odynerus, 309.
- Mesostenus tripartitus, 66, 112, 136, 186, 220.
- Mesotrichia*, 105.
- Metaparagia, 13.
- Metapolybia, 15.
- metatarsalis, *Odynerus*, 305.
- metemmensis, *Odynerus*, 306.
- metricus, *Polistes*, 257 (ethology).
- mexicanus, *Zethus*, 32 (ethology), 40.
- meyeri, *Odynerus*, 134, 181, **182**, **306**.
Rhynchium, 306.
- meyeri var. albolimbatus, *Odynerus*, 134, 181, **182**, **306**.
- Micreumenes*, 44, 273.
curriei, 44, 46, 47, 49, 273.
- microrrhæa*, *Vespa crabro*, 322.
- mimetica**, *Synagris rufopicta* var., 6, **226**, **324**.
- miniatus, *Odynerus*, 290.
- minor*, *Icaria hova* var., 342.
Ropalidia hova var., 342.
- minuta*, *Synagris*, 222, 319.
- mirabilis, *Odynerus*, 145.
Synagris, 126, 201 (ethology), 202, 215, 216, 217, 219, **324**.
- mirabilis var. decoratus, *Odynerus*, 145.
- mirabilis var. rothi, *Odynerus*, 145.
- mirabilis var. superbus, *Odynerus*, 145.
- Mischocyttarus, 15, 23, 35, 36.
labiatus, 231.
- Monerebia, 14.
- Monobia, 14, 23.
- Montezumia, 14, 21, 27, 91, 92, 105, **289**.
amaliæ, 99, 105.
australiensis, 99.
azurescens, 289.
var. rufidentata, 289.
bimaculata, 289.
- moricei*, *Nortonia*, 285.
- morula, *Nortonia*, 96, 103, **107**, 108 (Figs. 96-100), **286**.
- moseri*, Eumenes, 79, 282.
- mossambicum*, *Rhynchium cyanopterum* var., 146, 296.
- mucronatus, *Odynerus*, 306.
- multicolor, *Odynerus*, 178, **306**.
- multispinosum*, *Rhynchium*, 306.
- multispinosus, *Odynerus*, 145, **306**.
- murarius, *Ancistrocerus*, 112 (ethology).
- mutabilis, *Odynerus*, 306.
- mutans, *Odynerus*, 178, 306.
- Myrapetra, 15, 93, 238.
scutellaris, 93.
sericea, 246.

- natalensis*, *Hymenosmithia*, 274.
 Labus, 274.
 Odynerus, 125, 153, **306**.
 Raphiglossa, 270.
 Rhaphidoglossa, 270.
 Smithia, 43, 44, 274.
neavei, *Ancistrocerus*, 113, 114, **119**,
 120 (Figs. 116–117), **289**.
 Odynerus, 289.
 Odynerus grayi var., 299.
 Rhynchium grayi var., 299.
Nectarina, 15.
negusi, *Synagris*, 125, 202, 203, 215, 216,
 217, **324**.
neonymus, *Odynerus*, 310.
neuvillei, *Ancistrocerus*, 120, **289**.
 Odynerus, 289.
niassæ, *Synagris*, 327.
 Synagris proserpina var., 327.
nidulator, *Ancistrocerus*, 112 (ethology).
nigricans, *Dorylus*, 238.
 Synagris huberti var., 224, **323**.
nigripennis, *Ceramius*, 268.
nigritus, *Labus*, 284.
 Pachymenes, 284.
nigroclypeata, *Synagris analis* var., 219,
 321.
nigrofemorata, *Icaria*, 343.
 Ropalidia, 343.
nigroviolaceus, *Catilostenus*, 350.
niloticum, *Rhynchium*, 307.
niloticus, *Odynerus*, 126, **307**.
nitidula, *Icaria*, 343.
 Ropalidia, 343.
nitidulus, *Odynerus*, 162.
nobilis, *Icaria*, 343.
 Ropalidia, 250, **343**.
Nortonia, 6, 14, 21, 27, 87, **90**, 94
 (ethology, key to species), 105,
 116, 122, **285**.
 aberratica, 94, 95, **285**.
 acarophila, 6, 94, 95, **97** (Figs. 81–
 84), 105, **285**.
 ægyptiaca, **285**, 286.
 bisuturalis, 94, 95, 96, **102**, 104
 (Figs. 92–94), 105, 106, 107, 110,
 116, **285**.
 braunsii, 94, 96, 102, 105, **106** (Fig.
 95), 107, 116, **286**.
 caffra, 286.
 crassinoda, 283.
 difformis, 286.
 eumenoides, 284.
 fragosa, 97, **107**, **286**.
 gambiensis, 99, **286**.
 heydeniana, 107, 285, **286**.
 intermedia, 91, 92, 285.
 kibonotensis, 286.
 kibonotoensis, 286.
 lævis, 284.
 maculiscapa, 286.
 malelensis, 6, 95, **109**, 110 (Figs.
 101–106), **286**.
 morula, 96, 103, **107**, 108 (Figs. 96–
 100), **286**.
 moricei, 285.
 parvula, 287.
 polydora, 96, 99, **107**, **287**.
 rufogquadripustulata, 284.
 schulthessiana, 92, 284.
 soror, 94, 96, 107, **287**.
 striativentris, 289.
 symmorpha, 91, 92.
 tolteca, 87, 91.
 tricarinulata, 6, 95, **99**, 100 (Figs.
 85–91), **287**.
norwegica, *Vespa*, 22.
notabilis, *Odynerus*, 316.
nudus, *Odynerus*, 290.
nyassæ, *Odynerus*, 307.
 Rhynchium, 307.
 Synagris, 327.
 Synagris proserpina var., 202, 204,
 327.
obscurus, *Odynerus*, 316.
occidentalis, *Belonogaster*, 336.
oculata, *Vespa*, 121, 292, 307.
oculatum, *Rhynchium*, 307.
 Rygius, 307.
oculatum var. *somalicum*, *Rhynchium*,
 307.
 Rygius, 307.
oculatus, *Odynerus*, 121, 122, 145, 292,
 307.
oculatus var. *lefebvrei*, *Odynerus*, 145.
oculatus var. *somalicus*, *Odynerus*, 145,
 307.

- odontophora*, *Synagris*, 147, 148, 149, 152, 312.
odontophorum, *Rhynchium*, 313.
Odynerus, 5, 6, 7, 14, 21, 22, 23, 24, 25, 27, 55, 87, 91, 92, 93, 94, 105, 106, 112, **120**, 123 (ethology), **124**, 128 (key to species), 194, 195, 197, 228, **290**.
abdominalis, 292.
aberraticus, 285.
acanthoaspis, 292.
adonis, 124, 195, **290**, 318.
ægyptiacus, 285.
æquinoctialis, 292.
æquinoxialis, 292.
æstuans, 121, 126, 135, **138**, 139 (Figs. 124–130), 141, 142, 143, 223, **292**.
æstuans, 127, 138, 300.
æthiopicus, 292.
albifer, 315.
alboniger, 6, 132, **172**, 173 (Figs. 188–190), **292**.
alexandrinus, 290.
alienus, 315.
anceps, 123 (ethology), 125, 129, 150, **154**, 155 (Figs. 154–162), 156 (ethology), 159, 165, **292**.
andreas, 124, **293**.
angolensis, 124, 132, **135** (Figs. 118–121), 138, 171, **293**.
angustus, 194, **293**.
ardens, 125, 150, 156, **293**.
arethusæ, 293.
armatiscutis, 293.
asmarensis, 311.
auratus, 293.
aureosericeus, 293.
auro-maculatus, 123 (ethology), **293**.
azurescens, 289.
 var. *rufidentata*, 289.
bairstowi, 127, **294**.
bellatulus, 123 (ethology), 132, 172, 175, 176, 177, 178, **294**.
bellatus, 294.
benilensis, 127, 162, 163, 297.
bicinctus, 290.
biphaleratus, 287.
bisellatus, 294.
bisuturalis, 285.
bothriogaster, 127, 159, **294**.
broomi, 297.
budongo, 287.
cameroni, **294**, 317.
canaliculatus, 294.
capensis, 287.
capicola, 294.
carinatus, 297.
carinulatus, 126, 127, 128, **157** (Figs. 163–168), 160, 161, **294**.
caviventris, 127, **295**.
chagosensis, 313.
chapini, 6, 131, **188**, 189 (Figs. 209–213), **295**.
chloroticus, 295.
chrysomallus, 127, **295**.
cingulifer, 315.
cnemophilus, 295.
cænocephalus, 313.
cognatus, 315.
collega, 106.
combustus, 295.
concinnullus, 315.
conformis, 106.
congolensis, 6, 133, **176**, 177 (Figs. 193–197), **295**.
conradsii, 295.
corvus, 192, 295.
crenatus, 290.
curvifolius, 283.
cyanopterus, 129, 145, **146**, **296**, 301.
 var. **congicus**, 6, 145, **146**, **296**.
 var. *sabulosus*, 129, 145, **146**, **296**.
cylindricus, 310.
dantici, 182, 183, **296**.
dauensis, 296.
deceptor, 7, 127, 305.
defractus, 296.
denticulatus, 297.
desperatus, 6, 132, **166**, 167 (Figs. 178–182), 171, 172, 174, 176, **297**.
determinatus, 297.
difformis, 286.
dimidiatus, 297.
dimorphus, 297.
disjunctus, 315.
diversus, 315.
dotatus, 315.

- Odynerus dunbrodyensis*, 297.
emeryanus, 127, 133, **162**, **297**.
erythrinus, 297.
erythrospilus, 302.
erythrotomus, 297.
eumenoides, 284.
euryspilus, 297.
eversmanni, 290.
exiguus, 298.
exustus, 315.
falcatus, 123 (ethology), 131, **179**, **298**.
fallax, 125, **298**.
farquharensis, 298.
fastidiosissimus, 298.
fastidiosus, 296.
ferruginatus, 7, 127, 229, **298**.
ferrugineus, 298.
ferrugineus, 127, 298.
ferruginosus, 291.
fervens, 298.
fervidus, 299.
flavus, 316.
floricola, 128.
foraminosus, 299.
forticulus, 125, 153, 159, **299**.
frendens, 299.
fumipennis, 316.
gambiensis, 299.
gestroi, 127, 143, **291**.
goniodes, 127, **299**.
gonioides, 299.
gowdeyanus, 287.
grandidieri, 299.
grayi, 299.
 var. *neavei*, 299.
 var. *sumptuosus*, 299.
 var. *thomsoni*, 299.
 var. *usambaraensis*, 300.
guerinii, 127, **300**.
guineensis, 127, **300**.
guttulosus, 316.
hæmorrhoidalis, 24, 60, 145, **300**.
 var. *ater*, 145.
 var. *carnaticus*, 145.
 var. *dohertyi*, 145.
 var. *künckeli*, 145.
 var. *medius*, 145.
 var. *parentissimus*, 145.
 var. *quinquecinctus*, 145, **300**.
 var. *rubropictus*, 145.
 var. *salomonis*, 145.
 var. *sanguineus*, 145.
hansi, 301.
harrarensis, 178, **301**.
herrichii, 290.
heydenianus, 107, 286.
hildebrandti, 301.
histrionicus, 192, **301**.
histrionimimus, 6, 130, **190** (Figs. 214–220), **301**.
holomelas, 125, **301**.
holosericeus, 301.
hottentotus, 123 (ethology), 168, 169, 170, 172, 178, **301**.
hova, 302.
humbei, 316.
hyacinthæ, 123 (ethology), 127, 129, **160** (Figs. 169–173), 162 (ethology), 163, 164, **302**.
hyacinthæ, 302.
ignaruris, 302.
imbecillus, 111, 288.
impunctatus, 288.
incensus, 125, **302**.
inconstans, 288.
indecorus, 302.
inermis, 126, **302**.
 var. *atratus*, 302.
inornatus, 316.
insignis, 317.
instabilis, 316.
intermedius, 91, 93, 94, 285.
interruptus, 309.
invisus, 287.
jocosus, 302.
junodi, 126, **302**, 303.
junodianus, 125, **302**.
kabarensis, 6, 131, 184, **186**, 187 (Figs. 203–208), 188, 189, **303**.
karibæ, 303.
katonai, 303.
kelidopterus, 303.
kibonotensis, 286.
kilimandjaroensis, 303.
kloofensis, 303.
kristensenii, 303.
lacuum, 126, 302, **303**.

- Odynerus lateralis*, 6, 127, 131, 132, 134, 143, 179, **180, 181** (key to varieties), 182, **303**.
 var. **lateropictus**, 6, **181, 303**.
 var. **unicolor**, 181, **303**.
limbatus, 290.
lineaticollis, 288.
 var. **rufopictus**, 288.
longstaffi, 312.
luctuosus, 125, **304**.
lufiræ, 288.
lugubris, 125, 181, **304**.
macrocephalus, 178, **304**.
maculiscapus, 286.
madecassis, 125, **304**.
magrettii, 125, 153, **304**.
malagassus, 304.
marginellus, 123 (ethology), 127, 129, 134, **143** (Figs. 134-135), 145 (ethology), 146, 148, 181, **304**.
marginipunctatus, 305.
marginiscutis, 305.
massaicus, 288.
massanensis, 288.
massauensis, 288.
mauritanicus, 290.
meade-waldoi, 7, 127, **305**.
melanchrous, 125, **305**.
melanodontus, 305.
melanus, 305.
mephisto, 126, **305**.
meridionalis, 305.
meruensis, 309.
metatarsalis, 305.
metemmensis, 306.
meyeri, 134, 181, **182, 306**.
 var. **albolimbatus**, 134, 181, **182, 306**.
miniatus, 290.
mirabilis, 145.
 var. **decoratus**, 145.
 var. **rothi**, 145.
 var. **superbus**, 145.
mucronatus, 306.
multicolor, 178, **306**.
multispinosus, 145, **306**.
mutabilis, 306.
mutans, 178, **306**.
natalensis, 125, 153, **306**.
neavei, 289.
neonymus, 310.
newillei, 289.
niloticus, 126, **307**.
nitidulus, 162.
notabilis, 316.
nudus, 290.
nyassæ, 307.
obscurus, 316.
oculatus, 121, 122, 145, 292, **307**.
 var. **lefebvrei**, 145.
 var. **somalicus**, 145, **307**.
o'neili, 307.
oogaster, 307.
osborni, 6, 126, 135, **141, 142** (Figs. 131-133), 265, **307**. Pl. I, Fig. 4.
pakasæ, 307.
parvulus, 287, 296.
penetratus, 307.
perfidiosus, 308.
pharao, 289.
picturatus, 6, 124, 132, **137** (Figs. 122-123), **308**.
politiclypeus, 127, 130, **308**.
posticus, 301.
privatus, 316.
pseudolateralis, 127, 134, 143, **182, 183, 308**.
pulchellus, 308.
pulchripiloselloides, 308.
pulchripilosellus, 308.
punctatipennis, 308.
quadrisectus, 112.
quadri-tuberculatus, 308.
quartinæ, 291.
14-maculatus, 131, 179, 298.
radialis, 308.
raffrayi, 316.
rectus, 290.
reniformis, 123 (ethology).
rhizophorarum, 6, 130, **192, 193** (Figs. 221-225), **309**.
rhynchiformis, 290.
rhynchoides, 183, **309**.
rikatlensis, 309.
rotundatus, 316.
rotundiscutis, 309.
roubaudi, 289.

- Odynerus rubellulus*, 309.
 rubens, 309, 310.
 rubroniger, 309.
 rufiventris, 309.
 rufoniger, 6, 126, 133, 134, 164, 165
 (Figs. 174–177), 310.
 rufoquadripustulatus, 284.
 sakalavus, 310.
 saussurei, 309.
 savignyi, 291.
 schönlandi, 310.
 schubotzianus, 127, 134, 310.
 schultzei, 310.
 schultzeanus, 310.
 scripticeps, 310.
 selectus, 316.
 senegalensis, 291.
 senex, 310.
 sesquicinctus, 310.
 seychellensis, 310.
 sheffieldi, 121, 133, 167, 172, 174
 (Figs. 191–192), 177, 178, 310.
 var. ***marginifasciatus***, 6, 176, 310.
 signatus, 127, 311.
 signiferus, 311.
 silaisensis, 311.
 silas, 186, 311.
 var. *asmarensis*, 311.
 var. *ukerewensis*, 311.
 silverlocki, 311.
 simonyi, 311.
 simplex, 291.
 simplidentatus, 311.
 sirdari, 125, 311.
 sjöstedti, 186, 189, 311, 315.
 socotræ, 312.
 solstitialis, 312.
 spiniger, 143, 291.
 var. *maculatus*, 291.
 spinipes, 124, 290.
 spoliatus, 312.
 stellenboschensis, 312.
 stellaboschensis, 312.
 stigma, 312.
 stipatus, 316.
 stiraspis, 128, 314.
 striativentris, 289.
 symmorphus, 87.
 synagroides, 126, 134, 147 (Figs. 136–142), 150, 152, 164, 312.
 synagroides, 148, 150, 153, 314.
 tectus, 313.
 tegularis, 316.
 tegularis, 294.
 tessmannianus, 313.
 testaceus, 295.
 tinctus, 317.
 torridus, 317.
 trilobus, 25, 313.
 tripunctatus, 313.
 trogloclites, 313.
 tropicalis, 123 (ethology), 130, 183, 184 (Figs. 198–202), 185 (ethology), 220, 313.
 truncatus, 181, 303.
 var. *unicolor*, 303.
 ueleensis, 6, 132, 170 (Figs. 183–187), 313.
 ukerewensis, 311.
 uncatus, 126, 166, 314.
 vaalensis, 314.
 ventralis, 126, 129, 148, 150, 151 (Figs. 143–153), 154, 155, 156, 158, 159, 314.
 versicolor, 128, 314.
 vulneratus, 314.
 walker, 314.
 wellmani, 128, 314.
 whiteanus, 314.
 xanthosoma, 229, 328.
 xanthurus, 126, 145, 315.
 yngve, 186, 315.
 zebra, 289.
 zebroides, 291.
 zonatus, 315.
 o'neili, *Odynerus*, 307.
 oogaster, *Odynerus*, 307.
 Rhynchium, 307.
 Oplomerus, 124, 194, 290.
 Oplopus, 124, 194, 290.
 alexandrinus, 290.
 eversmanni, 291.
 oraniensis, *Celonites*, 269.
 Jugurtia, 269.
 orientalis, *Gyrostoma*, 255.
 Polybia, 238.
 Vespa, 349.

- orientalis* var. *ægyptiaca*, *Vespa*, 349.
ornata, *Synagris*, 320.
ornatissima, *Synagris*, 126, 202, 214, 216, **324**.
ornativentris, *Eumenes*, 279, **282**.
ornatus, *Belonogaster*, 330.
Polistes, 348.
osborni, **Odynerus**, 6, 126, 135, **141**, 142 (Figs. 131-133), 265, **307**. Pl. I, Fig. 4.
Osprynchotus, 211, 212, 213, 220, 221.
flavipes, 211.
heros, 211.
violator, 211, 212, 220.
oviventris, *Ancistrocerus*, 112 (ethology).
Pachymenes, 6, 14, 21, 23, 27, 55, **87** (ethology), 88 (key to species), 92, 93, 94, 122, 123, **283**.
astutus, 88, **90** (Fig. 80), **283**.
ater, 87 (ethology).
congensis, 6, **88** (Figs. 74-79), 90, 265, **283**. Pl. I, Fig. 2.
crassinodus, 283.
curvirufolineatus, 283.
eumenoides, 284.
finitimus, 284.
fraterculus, 284.
lævis, 284.
nigritus, 284.
pallipes, 93.
pilifrons, 87 (ethology).
rufoquadripustulatus, 284.
schulthessianus, 92, **284**.
sericeus, 87 (ethology), 92, 93, 283.
socotræ, 284.
symmorphus, 87, 91, 92.
toltecus, 87, 91.
transiens, 285.
Pachyophthalmus, 66.
pelopœi, 66.
pakasæ, *Odynerus*, 307.
pallens, *Belonogaster griseus* var., 332.
pallipes, *Pachymenes*, 93.
Paraceramius, 268.
Parachartergus, 16.
Paracrias, 232.
paradoxa, *Quartinia*, 270.
Paragia, 13.
Paragreenia, 105.
Paragris, 203, **214** (key to species), **319**.
Paraicaria, 16.
Paralastor, 14, 121.
Paramasaris, 13.
Paramischocyttarus, 14, 21, 24, 25, 26, **35**, 36, 37 (ethology; Fig. 6, distribution), **272**.
africanus, 272.
buyssoni, 36, 37 (ethology), **38**, 39 (Figs. 7-12), 265, **272**. Pl. I, Fig. 1.
lacuum, 36, **272**.
subtilis, 36, 37, **272**.
Paramiscocytharus buyssoni, 272.
Parapolybia, 15, 23, 24, 238, 255.
tabida, 338.
var. *isabellina*, 338.
var. *melaina*, 337.
Pararhaphidoglossa, 13.
Parazumia, 14, 99, 289.
parentissimus, *Odynerus hæmorrhoidalis* var., 145.
Pareumenes, 14, 21, 24, 26, 55, **271**.
marshalli, 272.
quadrispinosus, 271.
sansibaricus, 271.
parietina, *Vespa*, 287.
parietum, *Ancistrocerus*, 112 and 123 (ethology), 287.
Vespa, 287.
parvula, *Nortonia*, 287.
parvulus, *Leptochilus*, 287.
Odynerus, 287, 296.
pelopœi, *Pachyophthalmus*, 66.
Pelopceus, 66, 231.
penetratus, *Odynerus*, 307.
pensilis, *Eumenes*, 278.
Eumenes lepeletieri var., 76, 77, **278**.
pentameria, *Synagris*, 319.
perfidiosum, *Rhynchium*, 308.
perfidiosus, *Odynerus*, 308.
peringeyanus, *Eumenes*, 86, **283**.
peringueyi, *Ceramius*, 268.
perkinsii, *Polistes*, 347.
perplexus, *Eumenes*, 274.
petiolata, *Eumenes*, 281.
Vespa, 281, 335.

- petiolatus, *Belonogaster*, 335.
Eumenes maxillosus var., 58, 59, 60, 63 (Fig. 49, distribution), 65, 67 (ethology), **281**.
phalansterica, *Icaria*, 246, 343.
Ropalidia, 247, **343**.
phalerata, *Vespa*, 317.
phaleratus, *Pterochilus*, 195 (ethology), 317.
phaleratus var. *chevrieranus*, *Pterochilus*, 195 (ethology).
pharao, *Ancistrocerus*, 289.
Odynerus, 289.
Philanthus bicolor, 267.
phthisicus, *Eumenes*, 283.
picturatus, *Odynerus*, 6, 124, 132, **137** (Figs. 122–123), **308**.
pictus, *Belonogaster*, 332.
pilifrons, *Pachymenes*, 87 (ethology).
Pison, 195.
Plagiolabra, 14.
plebejus, *Polistes*, 348.
Polistes marginalis var., 348.
Plesiozethus, 13.
Polistella, 255.
Polistes, 4, 5, 6, 15, 17, 21, 23, 24, 25, 28, 229, 231, 243, 246, 248, **252**, 256 (ethology), 257 (key to species), **345**.
africana, 348.
albicinctus, 345.
albocalcaratus, 345.
americanus, 257 (ethology).
aquilinus, 5, 256, 257, 258, **259**, 260 (Figs. 250–254), **345**. Pl. I, Fig. 10.
badius, 345.
bicolor, 255.
bituberculatus, 346.
canadensis, 253, 254.
carnifex, 253.
defectivus, 346.
ellenbergi, 346.
fastidiosus, 256, 257, 258, 259, **260** (Figs. 255–257), 265, **346**.
 var. *sikoræ*, 256, 259, 260, 261, **346**.
flavipennis, 346.
flavobilineata, 255.
fuscatus, 253.
gallicus, 253, 254 (Fig. 249), 256, 257 (ethology), 258, 262, 345.
gyrostoma, 255.
haugi, 257, 259, **261**, **346**.
hebræus, 347.
hebræus, 346.
incertus, 348.
inornatus, 348, 349.
macaensis, 25, **346**.
macrocephalus, 6, 257, 258, **261**, 262 (Figs. 260–262), **347**.
maculipennis, 347.
madecassus, 255, 256, 257, 259, **347**.
manillensis, 255.
marginalis, 257, 258, 262, **263** (Figs. 263–265), 264, **347**.
 var. *africanus*, 348.
 var. *inornatus*, 348.
 var. *plebejus*, 348.
 var. *stigma*, 348.
metricus, 257 (ethology).
ornatus, 348.
perkinsii, 347.
plebejus, 348.
rubidus, 348.
saussurei, 348.
sikoræ, 346.
smithii, 257, 259, **261** (Figs. 258–259), **348**.
spilophorus, 257, 259, 263, **264** (Figs. 266–267), **349**.
spiloptera, 349.
subsericeus, 253, 255.
tenellus, 264, 349.
tristis, 349.
tullgreni, 349.
versicolor, 257 (ethology).
Polistinæ, 16, 22, **252**, **345**.
Polistoides, 255.
Polistratus, 255.
politica, *Icaria*, 250, 342.
politiclypeus, *Odynerus*, 127, 130, **308**.
Polybia, 15, 41, 93, 238, 246.
bucula, 242, 338.
indica, 238.
melaina, 337.
orientalis, 238.
tabida, 238, 338.
Polybioides, 15, 21, 23, 24, 25, 28, 93,

- 238**, 239 (ethology, key to species), **337**.
melaina, 239, 240 (Fig. 239), **242**, 243 (ethology), 244, 265, **337**. Pl. V, Figs. 1 and 2.
tabida, 238, 239, **240** (Fig. 238), 241 (ethology), 242, 265, 337, **338**. Pl. I, Fig. 7; Pl. IV, Fig. 2.
 var. *isabellina*, 240, **338**.
 var. *melaina*, 337.
Polybius, 238.
polydora, *Nortonia*, 96, 99, **107**, **287**.
pomicolor, *Belonogaster*, 330.
 Icaria, 343.
 Ropalidia, 343.
posticus, *Odynerus*, 301.
prasina, *Icaria*, 343.
 Ropalidia, 343.
prasinus, *Belonogaster*, 248, **335**.
prasinus var. *bicolor*, *Belonogaster*, 336.
privatus, *Odynerus*, 316.
promontorii, *Alastor*, 328.
 Celonites, 269.
proserpina, *Synagris*, 126, 202, 203, 204, 205, 207, **327**.
proserpina var. *niassæ*, *Synagris*, 327.
proserpina var. *nyassæ*, *Synagris*, 202, 204, **327**.
Protonectarina, 15.
 sylveibæ, 246.
Protopolybia, 15.
Provespa, 17, 23, 24.
Pseudagris, 202, **227**, 228 (key to species), **318**.
Pseudochartergus, 15.
Pseudochilus, 14, 21, 24, 27, 87, **285**.
 glabripalpis, 27, 87, **285**.
Pseudodynerus, 112.
pseudolateralis, *Odynerus*, 127, 134, 143, **182**, 183, **308**.
Pseudomasaris, 13.
Pseudopolybia, 16.
Pseudopterocheilus, 194.
Pseudozethus, 14.
Psiloglossa, 13, 23.
Psiloglossa, 13.
 simplicipes, 13.
Pterocheilus, 317.
 eurystomus, 317.
 iterabilis, 317.
Pterochilus, 14, 21, 24, 27, 87, 124, **194**, 195 (ethology), **317**.
 biglumis, 317.
 capensis, 317.
 dives, 317.
 eurystomus, 317.
 glabripalpis, 87, 285.
 insignis, 317.
 iterabilis, 317.
 major, 317.
 phaleratus, 195 (ethology), 317.
 var. *chevrieanus*, 195 (ethology).
 pulchellus, 195 (ethology).
 savignyi, 317.
 versicolor, 124, 194, 290, **318**.
pubescens, *Zethus*, 271.
pulchella, *Icaria*, 343.
 Ropalidia, 343.
pulchellum, *Rhynchium*, 308.
pulchellus, *Odynerus*, 308.
 Pterochilus, 195 (ethology).
pulcherrimus, *Eumenes maxillosus* var., 59, 63 (Fig. 49, distribution), 64, 65, **281**.
pulchripennis, *Eumenes*, 276.
pulchripiloselloides, *Odynerus*, 308.
pulchripilosellus, *Odynerus*, 308.
punctata, *Rhaphidoglossa*, 270.
punctatipennis, *Odynerus*, 308.
purcelli, *Celonites*, 269.
purcelli var. *flavomaculatus*, *Celonites*, 269.
pusillus, *Belonogaster*, 234, 235, **236**, 329, **336**.
quadripunctata, *Synagris*, 323.
quadrisectus, *Odynerus*, 112.
quadrispinosus *Eumenes*, 271.
 Pareumenes, 271.
quadri-tuberculatus, *Odynerus*, 308.
quartinæ, *Odynerus*, 291.
Quartinia, 13, 21, **270**.
 dilecta, 270.
 capensis, 270.
 paradoxa, 270.
14-maculatus, *Odynerus*, 131, 179, **298**.
quinquecincta, *Vespa*, 300.

- quinquecinctum*, *Rhynchium hæmorrhoidale* var., 301.
quinquecinctus, *Odynerus hæmorrhoidalis* var., 145, 300.
- radiale*, *Rhynchium*, 308.
radialis, *Odynerus*, 308.
raffrayi, *Odynerus*, 316.
ranavali, *Icaria*, 344.
Ropalidia, 344.
Raphigaster, 328.
filiformis, 330.
fliventrís, 331.
guerini, 333.
guineensis, 231, 334.
indicus, 333.
juncus, 329, 334.
madecassus, 335.
rufipennis, 331.
- Raphiglossa*, 13, 21, 25, **29** (ethology; Fig. 1, distribution), **270**.
braunsiana, 270.
eumenoides, 30 (ethology), 270.
filiformis, 271.
flavo-ornata, 29 (ethology), **30**, **270**.
natalensis, 270.
symmorpha, 30, **270**.
zethoides, 30 (ethology).
- Raphiglossinæ*, 13, 22, **29**, **270**.
rectus, *Odynerus*, 290.
regina, *Eumenes*, 281.
Icaria, 344.
Ropalidia, 344.
- reginus*, *Eumenes maxillosus* var., 58, 62 (Fig. 47, distribution), 64, 67 (ethology), **281**.
rendalli, *Eumenes*, 283.
reniformis, *Odynerus*, 123 (ethology).
Rethus broomi, 278.
rex, *Ceramius*, 268.
Rhaphidoglossa, 270.
braunsiana, 270.
flavo-ornata, 270.
natalensis, 270.
punctata, 270.
symmorpha, 270.
- Rhaphiglossa flavo-ornata*, 270.
rhizophorarum, *Odynerus*, 6, 130, **192**, 193 (Figs. 221-225), **309**.
- Rhopalidia*, 245, 338.
maculiventrís, 245.
- Rhynchagris*, 202, **227**, **318**.
Rhynchalastor, 14, 21, 24, 26, 127, **228**, **328**.
fuscipennis, 127, 229, **328**.
xanthosoma, 127, 229, **328**.
rhynchiformis, *Odynerus*, 290.
- Rhynchium*, 197, 292.
abdominale, 292.
abyssinicum, 293.
æstuans, 138, 292.
africanum, 304.
anceps, 292.
ardens, 293, 314.
aureo-maculatum, 294.
auro-maculatum, 293.
bioculatum, 294.
brunneum, 300.
chloroticum, 295.
chrysomallum, 295.
cyanopterum, 296.
var. *mossambicum*, 296.
denticulatum, 297.
dimidiatum, 297.
emeryanum, 301.
erythrinum, 297.
fallax, 298.
ferrugineum, 181, 298.
fervens, 298.
foraminosum, 299.
forticulum, 299.
furax, 181, 303.
gestroi, 291.
grayi, 299.
var. *neavei*, 299.
var. *sumptuosum*, 299.
var. *usambaraense*, 300.
hæmorrhoidale, 300.
var. *brunneum*, 301.
var. *quinquecinctum*, 301.
histrionicum, 301.
holomelas, 301.
holosericeum, 301.
imitator, 324.
incensum, 302.
inermis, 302.
var. *atratum*, 302.
junodi, 302.

- Rhynchium junodianum*, 302.
kelidopterum, 303.
lacuum, 303.
laterale, 304.
luctuosum, 304.
madecassum, 304.
madegasse, 304.
marginellum, 145, 304.
marginiscutis, 305.
mephisto, 305.
meyeri, 306.
multispinosum, 306.
niloticum, 307.
nyassæ, 307.
oculatum, 307.
 var. *somalicum*, 307.
odontophorum, 313.
oogaster, 307.
perfidiosum, 308.
pulchellum, 308.
radiale, 308.
rubens, 159, 309.
rufiventre, 159, 309.
sabulosum, 296.
schubotzianum, 310.
sichelii, 312.
signiferum, 311.
simonyi, 311.
sirdari, 311.
stironotum, 159, 295.
synagroides, 312.
tessmannianum, 313.
thomsoni, 299.
transvaalense, 146, 296.
transversum, 292.
tropidium, 314.
uncatum, 314.
usambaraense, 300.
versicolor, 314.
walkeri, 314.
xanthurum, 315.
zonatum, 315.
rhynchoides, *Odynerus*, 183, **309**.
rikatensis, *Odynerus*, 309.
rodhaini, **Zethus**, 6, 31, **33** (Figs. 2-5), 265, **271**. Pl. I, Fig. 5.
romandina, *Didymogastra*, 32.
romandinus, **Zethus**, 31 (ethology), 32.
Ropalidia, 15, 16, 21, 23, 24, 25, 28, 60, 93, 231, **244**, 248 (ethology), 249 (key to species; Fig. 240, distribution), 255, **338**.
æthiopica, **338**, 344.
africana, 338.
ambigua, 247, 250, **338**, 339.
anarchica, 247, **339**.
antennata, 339.
artifex, 247.
atra, 247, 339.
bicincta, 339.
brazzai, 250, **339**.
cabeti, 247.
capensis, 249, **250** (Figs. 241-242), **339**.
carinata, 339.
cariniscutis, 339.
cincta, 247, 248 (ethology), 249, 250, **251**, 252 (Figs. 246-248), 338, **340**.
clavata, 340.
constitutionalis, 340.
democratica, 340.
distigma, 338, 340, **341**.
dubia, 341.
ducalis, 341.
ferruginea, 247.
flavopicta, 246, 247.
fraterna, 341.
galimatia, 341.
 var. *ignobilis*, 341.
grandidieri, 247, **342**.
guttatipennis, 247, 248 (ethology), 249, **250**, 251 (Figs. 243-245), 265, 339, **342**, 343. Pl. I, Fig. 11.
hova, 247, **342**.
 var. *minor*, **342**.
interjecta, 342.
irrequieta, 342.
maculata, 342.
maculiventris, 244, 245, 246, 247, 338.
nigrofemorata, 343.
nitidula, 343.
nobilis, 250, **343**.
phalansterica, 247, **343**.
politica, 250.
pomicolor, 343.
prasina, 343.
pulchella, 343.

- Ropalidia ranavali*, 344.
regina, 344.
sakalava, 344.
schulthessi, 344.
scottiana, 344.
socialistica, 247.
subclavata, 344.
tomentosa, 344.
variabilis, 344.
variegata, 247.
velutina, 345.
venustula, 345.
vitripennis, 345.
xanthura, 345.
- Ropalidiinae*, 16, 22, 23, **244**, **338**.
rothi, *Odynerus mirabilis* var., 145.
rothkirchi, *Belonogaster*, 336.
rothschildanus, *Labus*, 274.
rothschildi, *Celonites*, 269.
rotundatus, *Odynerus*, 316.
rotundiscutis, *Odynerus*, 309.
roubaudi, *Ancistrocerus*, 112 (ethology), **289**.
Odynerus, 289.
Roubaudia rufescens, 232.
rubellulus, *Odynerus*, 309.
rubens, *Odynerus*, **309**, 310.
Rhynchium, 159, 309.
rubidus, *Polistes*, 348.
rubricans, *Vespa*, 350.
rubroniger, *Odynerus*, 309.
rubropictus, *Odynerus hæmorrhoidalis* var., 145.
rufa, *Synagris æstuans* var., 224, **320**.
rufescens, *Roubaudia*, 232.
rufidentata, *Montezumia azurescens* var., 289.
Odynerus azurescens var., 289.
rufipes, *Labus*, 274.
Smithia, 274.
rufipetiolatus, *Labus*, 274.
rufipennis, *Belonogaster*, 332.
Raphigaster, 331.
Sphex, 332.
rufithorax, *Synagris cornuta* var., 6, 207, **208**, 209, 265, **327**. Pl. II, Fig. 1.
rufiventre, *Rhynchium*, 159, 309.
rufiventris, *Odynerus*, 309.
rufolineatus, *Eumenes*, 283.
rufomaculatus, *Ceramius*, 268.
rufoniger, *Odynerus*, 6, 126, 133, 134, **164**, 165 (Figs. 174–177), **310**.
rufopicta, *Synagris*, 6, 126, 166, 214, 216, **225** (Figs. 234–236), **324**.
rufopicta var. **mimetica**, *Synagris*, 6, **226**, **324**.
rufopictus, *Ancistrocerus lineaticollis* var., 288.
Odynerus lineaticollis var., 288.
rufoquadripustulata, *Nortonia*, 284.
rufoquadripustulatus, *Odynerus*, 284.
Pachymenes, 284.
ruppelliana, *Synagris*, 325.
Rygchium, 55, 87, 93, 121, 122, 123, **124**, 127, 128 (key to species), 197, 228, **287**, **292**.
abyssinicum, 156, 293.
æstuans, 141.
africanum, 304.
anceps, 156, 292.
ardens, 293.
auro-maculatum, 293.
brunneum, 300.
cyanopterum, 296.
europæum, 121, 292, 307.
furax, 143.
gestroi, 291.
hæmorrhoidale, 300.
laterale, 305.
madecasse, 304.
mephisto, 305.
oculatum, 307.
 var. *somalicum*, 307.
sichelii, 148.
synagroides, 147, 148, 149, 312.
transversum, 292.
sabulosum, *Rhynchium*, 296.
sabulosus, *Odynerus cyanopterus* var., 129, 145, **146**, **296**.
sævus, *Belonogaster*, 234, **236**, **336**.
Belonogaster, 330.
sakalava, *Eumenes*, 77, 277.
Icaria, 344.
Ropalidia, 344.
sakalavus, *Eumenes lepelletieri* var., 278.
Odynerus, 310.

- salomonis, *Odynerus hæmorrhoidalis* var., 145.
 sanguineus, *Odynerus hæmorrhoidalis* var., 145.
sanguinolenta, *Eumenes*, 277.
sansibarica, *Eumenes*, 271.
sansibaricus, *Pareumenes*, 271.
saundersii, *Eumenes*, 58, 67.
saussurei, *Belonogaster*, 231 (ethology), **336**.
 Masaris, 266.
 Odynerus, 309.
 Polistes, 348.
savignyi, *Eumenes*, 279.
 Odynerus, 291.
 Pterochilus, 317.
schach, *Gyrostoma*, 255.
schinzii, *Alastor*, 328.
schönlandi, *Odynerus*, 310.
schubotzianum, *Rhynchium*, 310.
schubotzianus, *Odynerus*, 127, 134, **310**.
schulthessi, *Ceramius*, 268.
 Icaria, 344.
 Odynerus, 310.
 Ropalidia, 344.
schulthessiana, *Nortonia*, 92, 284.
schulthessianus, *Pachymenes*, 92, **284**.
schultzeanus, *Eumenes*, 278.
 Odynerus, 310.
scottiana, *Icaria*, 344.
 Ropalidia, 344.
scripticeps, *Odynerus*, 310.
scutellaris, *Myrapetra*, 93.
selectus, *Odynerus*, 316.
senegalensis, *Odynerus*, 291.
senex, *Odynerus*, 310.
sericea, *Myrapetra*, 246.
 Synagris, 326.
sericeus, *Pachymenes*, 87 (ethology), 92, 93, 283.
sesquicinctus, *Odynerus*, 310.
sex-maculatus, *Belonogaster*, 330.
seychellensis, *Odynerus*, 310.
sheffieldi, *Odynerus*, 6, 121, 133, 167, 172, **174** (Figs. 191-192), 177, 178, **310**.
sheffieldi var. *marginifasciatus*, *Odynerus*, 6, **176**, **310**.
sicheliana, *Synagris*, 221, 322.
sichelianus, *Labus*, 42, 43, 44.
 Zethus, 43.
sichelii, *Rhynchium*, 148, 312.
signaticornis, *Eumenes*, 283.
signatus, *Odynerus*, 127, **311**.
signicornis, *Eumenes*, 283.
signiferum, *Rhynchium*, 311.
signiferus, *Odynerus*, 311.
sikoræ, *Polistes*, 346.
 Polistes fastidiosus var., 256, 259, 260, 261, **346**.
silaensis, *Odynerus*, 311.
silaos, *Odynerus*, 186, **311**.
silaos var. *asmarensis*, *Odynerus*, 311.
silaos var. *ukerewensis*, *Odynerus*, 311.
silverlocki, *Odynerus*, 311.
similis, *Synagris*, 125, 202, 203, 204, 210, **327**.
Synagris cornuta var., 6, 125, 204, 207, **210**, 265, **327**. Pl. II, Fig. 8.
similis var. *maculata*, *Synagris*, 202, 204, 210, **327**.
simonyi, *Odynerus*, 311.
 Rhynchium, 311.
simplex, *Odynerus*, 291.
simplicipes, *Psiloglossa*, 13.
simplidentatus, *Odynerus*, 311.
simpsoni, *Jugurtia*, 270.
sirdari, *Odynerus*, 125, **311**.
 Rhynchium, 311.
sjöstedti, *Odynerus*, 186, 189, **311**, 315.
Smithia, 43, 44, 49, 272.
 natalensis, 43, 44, 274.
 rufipes, 274.
smithii, *Eumenes*, 55 (ethology).
 Polistes, 257, 259, **261** (Figs. 258-259), **348**.
socialistica, *Icaria*, 247.
 Ropalidia, 247.
socotræ, *Labus*, 284.
 Odynerus, 312.
 Pachymenes, 284.
solstitialis, *Odynerus*, 312.
somalicum, *Rhynchium oculatum* var., 307.
 Rygchium oculatum var., 307.
somalicum, *Odynerus oculatus* var., 145, **307**.
soror, *Nortonia*, 94, 96, 107, **287**.

- Sphex cruciata*, 275.
rufipennis, 332.
tinctor, 279.
spilocera, *Eumenes*, 277.
spilophorus, *Polistes*, 257, 259, 263, **264**
 (Figs. 266–267), **349**.
spiloptera, *Polistes*, 349.
spiniger, *Labus*, 42, 45, 273.
Odynerus, 143, **291**.
spiniger var. *maculatus*, *Odynerus*, 291.
spinipes, *Odynerus*, 124, 290.
Vespa, 290.
Zethus, 31 (ethology).
spiniventris, *Synagris*, 112, 125, 201, 215,
 216, 218, **219**, 220 (ethology), 221,
324.
Vespa, 324.
spinolæ, *Masaris*, 266.
spinosuscula, *Synagris*, 125, **325**.
splendidum, *Stilbum*, 66.
spoliatus, *Odynerus*, 312.
squamigera, *Vespa*, 290.
stellaboschensis, *Odynerus*, 312.
stellenboschensis, *Odynerus*, 312.
Stelopolybia, 16, 238.
Stenodynerus, 192, 194.
ferrugineus, 7, 229, 298.
 var. *mafiensis*, 229, 328.
Stenogaster, 15, 24, 35, 36.
Stenogastrinae, 14, 22, 23.
stigma, *Odynerus*, 312.
Polistes marginalis var., 348.
Stilbum, 66, 67.
amethystinum var. *cyanurum*, 66.
splendidum, 66.
stipatus, *Odynerus*, 316.
stiraspis, *Odynerus*, 128, 314.
stironotum, *Rhynchium*, 159, 295.
striativentris, *Ancistrocerus*, 120, **289**.
Nortonia, 289.
Odynerus, 289.
strigosus, *Zethus*, 44.
Stroudia, 43, 273.
armata, 43, 273.
stuhlmanni, *Eumenes lepeleterii* var.,
 77, **78**, **278**.
Synagris, 324.
Subancistrocerus, 113, 117.
subclavata, *Icaria*, 344.
Ropalidia, 344.
subsericeus, *Polistes*, 253, 255.
subtilis, *Paramischocyttarus*, 36, 37, **272**.
sulcigaster, *Eumenes*, 86, **283**.
sumptuosum, *Rhynchium grayi* var., 299.
sumptuosus, *Odynerus grayi* var., 299.
superbus, *Labus*, 274.
Odynerus mirabilis var., 145.
swalei, *Labus*, 274.
sylveibæ, *Protonectarina*, 246.
symmorpha, *Nortonia*, 91, 92.
Raphiglossa, 30, 270.
Rhaphidoglossa, 270.
symmorplus, *Odynerus*, 87.
Pachymenes, 87, 91, 92.
Synagris, 6, 10, 11, 14, 21, 24, 25, 27, 124,
 125, 126, 134, 147, 148, 149, 150,
 156, 165, 166, **195**, 196 (Fig. 226,
 distribution), 201 (ethology), 202
 (key to species), **203**, **318**, **325**, 350.
abdominalis, 321.
abyssinica, 125, 126, 196, 201, 205
 (Fig. 230), 215, 217, **222**, **319**.
 var. *albofasciata*, 126, 222, **223**,
320.
 var. *emarginata*, 196, **222**, **320**.
æquatorialis, 324.
æstuans, 126, 140, 214, 217, **223**, 226,
 265, **320**. Pl. I, Fig. 6.
 var. *rufa*, 224, **320**.
æstuans, 292.
æthiopica, 319.
affinis, 325.
amplissima, 320.
analis, 125, 196, 215, 216, **218**, 219,
 222, 319, **320**.
 var. *nigroclypeata*, 219, **321**.
aterrima, 125, 202, 228, **318**.
basalis, 326.
bellicosa, 322.
calida, 125, 201, 215, 218, **221**
 (ethology), **321**.
calida, 220, 325.
capitata, 325.
carinata, 125, **318**.
clypeata, 201, 323.
combusta, 221, 322.
cornuta, 6, 10, 11, 120, 125, 126, 133,
 134, 197, 198 (Figs. 227–229,

- mouth parts), 199, 200, 201, 203, **204**, 205 (Fig. 231), 206 (Figs. 232-233), 207 (key to varieties), **208**, 211 (ethology), 214, 216, 221, 222, 224, 226, 228, 229, 265, 318, **325**. Pl. II, Fig. 2.
- var. *basalis*, 208, **209**, 210, 226, 265, **326**. Pl. II, Fig. 5.
- var. *didieri*, 208, **209**, 211 (ethology), 265, **326**. Pl. II, Fig. 4.
- var. *flavofasciata*, 6, 199, 207, **210**, 213 (ethology), 265, **327**. Pl. II, Fig. 7.
- var. *ituriensis*, 6, 207, **209**, 265, **327**. Pl. II, Fig. 3.
- var. *maculata*, 6, 207, **210**, 265, **327**. Pl. II, Fig. 6.
- var. *rufithorax*, 6, 207, **208**, 209, 265, **327**. Pl. II, Fig. 1.
- var. *similis*, 6, 125, 204, 207, **210**, 265, **327**. Pl. II, Fig. 8.
- var. *ugandæ*, 326.
- crassipes*, 125, 215, 218, **223**, **322**.
- dentata*, 325.
- denticulata*, 297.
- didieri*, 326.
- dubia*, 321.
- elephas*, 125, **323**.
- emarginata*, 320.
- fasciata*, 323.
- ferox*, 325.
- fervida*, 319.
- flavomaculata*, 202, 327.
- fulva*, 203, **327**.
- var. *trispinosa*, 327.
- heydeniana*, 218, 321.
- huberti*, 126, 166, 214, 215, 217, **224**, 226, **323**.
- var. *bimaculata*, 224, 226, **323**.
- var. *clypeata*, 126, 166, 224, **225**, 226, **323**.
- var. *clypeata*, 323, 324.
- var. *nigricans*, 224, **323**.
- inermis*, 302.
- var. *atrata*, 302.
- imitator*, 226, 324.
- intermedia*, 321.
- kohli*, 125, 215, 218, **219**, **323**.
- mandibularis*, 221, 322.
- maxillosa*, 125, **323**.
- minuta*, 222, 319.
- mirabilis*, 126, 201 (ethology), 202, 215, 216, 217, 219, **324**.
- negusi*, 125, 202, 203, 215, 216, 217, **324**.
- niassæ*, 327.
- nyassæ*, 327.
- odontophora*, 147, 148, 149, 152, 312.
- ornata*, 320.
- ornatissima*, 126, 202, 214, 216, **324**.
- pentameria*, 319.
- proserpina*, 126, 202, 203, 204, 205, 207, **327**.
- var. *niassæ*, 327.
- var. *nyassæ*, 202, 204, **327**.
- quadripunctata*, 323.
- rufopicta*, 6, 126, 166, 214, 216, **225** (Figs. 234-236), **324**.
- var. *mimetica*, 6, **226**, **324**.
- ruppelliana*, 325.
- sericea*, 326.
- sicheliana*, 221, 322.
- similis*, 125, 202, 203, 204, 210, **327**.
- var. *maculata*, 202, 204, 210, **327**.
- spiniiventris*, 112, 125, 201, 215, 216, 218, **219**, 220 (ethology), 221, **324**.
- spinosuscula*, 125, **325**.
- stuhlmanni*, 324.
- tarsalis*, 321.
- tetrameria*, 322.
- trispinosa*, 327.
- tropidia*, 150, 152, 314.
- uncata*, 314.
- versicolor*, 126, 166, **228**, **318**.
- var. *meade-waldoi*, 126, 228, **318**.
- vicaria*, 27, 125, 126, 198, 200, 202, 227, **318**.
- var. *luteopicta*, 125, 227, **319**.
- xanthura*, 319, 321, 325.
- synagroides*, *Odynerus*, 126, 134, **147** (Figs. 136-142), 150, 152, 164, **312**.
- Odynerus*, 148, 150, 153, 314.
- Rhynchium*, 312.
- Ryggchium*, 147, 148, 149, 312.
- Synœca*, 15.
- irina*, 241.
- Synœcoides*, 15.

- tabida*, *Parapolybia*, 338.
Polybia, 238, 338.
Polybioides, 238, 239, **240** (Fig. 238), 241 (ethology), 242, 265, 337, **338**.
 Pl. I, Fig. 7; Pl. IV, Fig. 2.
Vespa, 238, 337, 338.
tabida var. *isabellina*, *Parapolybia*, 338.
Polybioides, 240, **338**.
tabida var. *melaina*, *Parapolybia*, 337.
Polybioides, 337.
Tanyzethus, 272.
africanus, 36, 272.
tarsalis, *Synagris*, 321.
tarsatus, *Belonogaster*, 336.
Tatua, 15.
tecta, *Vespa*, 313.
tectus, *Odynerus*, 313.
tegularis, *Odynerus*, 316.
Odynerus, 294.
tenellus, *Polistes*, 264, 349.
tessmanni, *Belonogaster*, 337.
Eumenes lepeleterii var., 65, 76, 77, **278**.
tessmannianum, *Rhynchium*, 313.
tessmannianus, *Odynerus*, 313.
testaceus, *Odynerus*, 295.
tetrameria, *Synagris*, 322.
thomsoni, *Odynerus grayi* var., 299.
Rhynchium, 299.
tinctor, *Eumenes*, 67, 279.
Sphex, 279.
tinctus, *Odynerus*, 317.
tolteca, *Nortonia*, 87, 91.
toltecus, *Pachymenes*, 87, 91.
tomentosa, *Icaria*, 344.
Ropalidia, 344.
torridus, *Odynerus*, 317.
transiens, *Labus*, 285.
Pachymenes, 285.
transvaalense, *Rhynchium*, 146, 296.
transvaalensis, *Discaliscus*, 35, 271.
transversa, *Vespa*, 292.
transversum, *Rhynchium*, 292.
Rygchium, 292.
tricarunculata, *Nortonia*, 6, 95, **99**, 100 (Figs. 85–91), **287**.
Trichotarsus, 105.
tricinctella, *Icaria*, 251, 340.
tricolor, *Belonogaster*, 336.
trifasciatus, *Ancistrocerus*, 112 (ethology).
triloba, *Vespa*, 313.
trilobus, *Odynerus*, 25, **313**.
Trimeria, 13.
tripartitus, *Mesostenus*, 66, 112, 156, 186, 220.
tripunctata, *Vespa*, 313.
tripunctatus, *Odynerus*, 313.
trispinosa, *Synagris*, 327.
Synagris fulva var., 327.
tristis, *Polistes*, 349.
troglydytes, *Odynerus*, 313.
tropica, *Eumenes*, 281.
tropicalis, *Eumenes*, 281.
Eumenes maxillosus var., 59, 63 (Fig. 48, distribution), 64, 65, **69**, 265, **281**. Pl. I, Fig. 3.
Odynerus, 123 (ethology), 130, **183**, 184 (Figs. 198–202), 185 (ethology), 220, **313**.
tropidia, *Synagris*, 150, 152, 314.
tropidium, *Rhynchium*, 314.
truncatus, *Odynerus*, 181, 303.
truncatus var. *unicolor*, *Odynerus*, 303.
tullgreni, *Polistes*, 349.
turbulentus, *Belonogaster*, 234, 235, **236**, **337**.
turgidus, *Belonogaster*, 337.
ueleensis, *Odynerus*, 6, 132, **170** (Figs. 183–187), **313**.
ugandæ, *Synagris cornuta* var., 326.
ukerewensis, *Odynerus*, 311.
Odynerus silaos var., 311.
uncata, *Synagris*, 314.
uncatum, *Rhynchium*, 314.
uncatus, *Odynerus*, 126, 166, **314**.
unguiculus, *Eumenes*, 55 (ethology).
unicolor, *Odynerus lateralis* var., 181, **303**.
Odynerus truncatus var., 303.
usambaraense, *Rhynchium*, 300.
Rhynchium grayi var., 300.
usambaraensis, *Odynerus grayi* var., 300.
vaalensis, *Odynerus*, 314.
variabilis, *Icaria*, 344.
Ropalidia, 344.

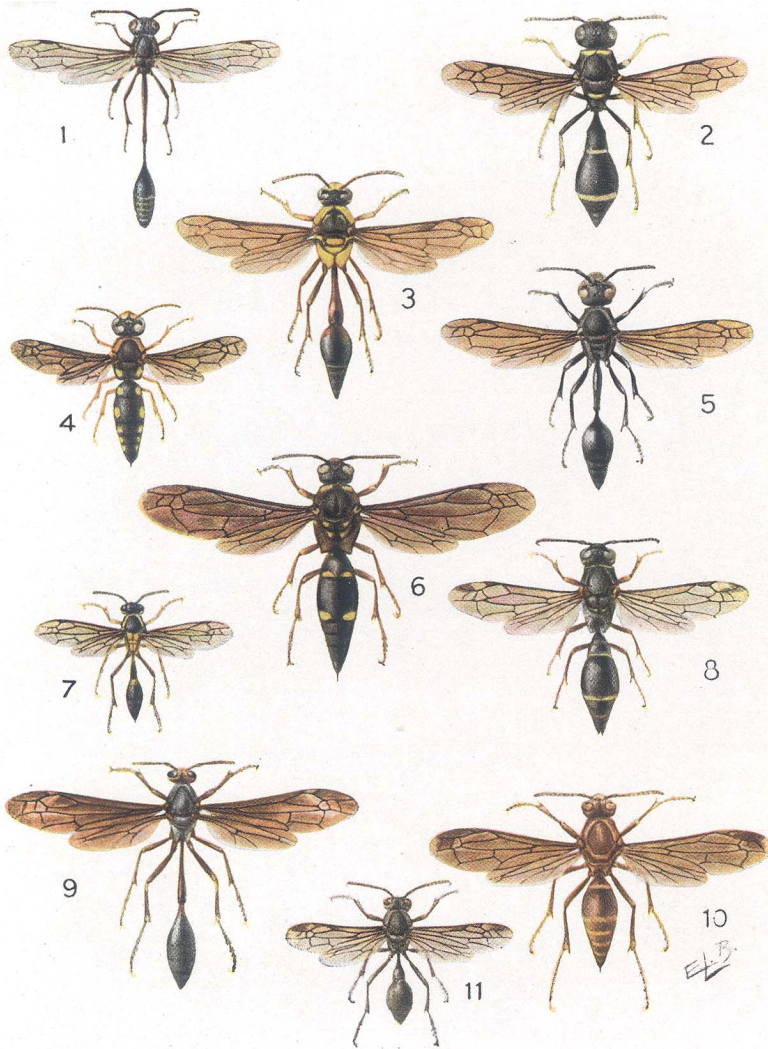
- variegata*, *Ropalidia*, 247.
variventris, *Eumenes*, 281.
vasseæ, *Belonogaster*, 234, **337**.
velutina, *Icaria*, 345.
Ropalidia, 345.
ventralis, *Odynerus*, 126, 129, 148, **150**,
 151 (Figs. 143-153), 154, 155, 156,
 158, 159, **314**.
venustula, *Icaria*, 345.
Ropalidia, 345.
versicolor, *Odynerus*, 128, **314**.
Polistes, 257 (ethology).
Pterochilus, 124, 194, 290, **318**.
Rhynchium, 314.
Synagris, 126, 166, **228**, **318**.
versicolor var. *meade-waldoi*, *Synagris*,
 126, 228, **318**.
Vespa, 4, 17, 21, 22, 23, 24, 28, 229, 257,
349.
abbreviata, 269.
abdominalis, 292.
æstuans, 320.
africana, 304.
arbustorum, 275.
aurata, 127, 162, 293.
brunnea, 300.
caffra, 275.
calida, 322.
carbonaria, 322.
cinerea, 334.
coarctata, 274.
cæruleopennis, 271.
cornuta, 208, 318, 325, 326.
crabro, 349.
crabro cornuta, 326.
crabro microrrhæa, 322.
crucigera, 275.
dantici, 296.
esuriens, 275.
gallica, 345.
germanica, 206.
grisea, 331.
guineensis, 280.
hæmorrhoidalis, 300.
hebræa, 347.
junceæ, 328, 334.
lateralis, 181, 303.
linearis, 331.
macaensis, 346.
macilentæ, 331.
marginalis, 348.
marginella, 304.
maxillosa, 279.
norwegica, 22.
oculata, 121, 292, 307.
orientalis, 349.
 var. *ægyptiaca*, 349.
parietina, 287.
parietum, 287.
petiolata, 281, 335.
phalerata, 317.
quinquecincta, 300.
rubricans, 350.
spinipes, 290.
spiniventris, 324.
squamigera, 290.
tabida, 238, 337, 338.
tecta, 313.
transversa, 292.
triloba, 313.
tripunctata, 313.
vespiformis, *Ceramius*, 268.
Masaris, 266.
Vespinæ, 17, 22, 23, **349**.
vicaria, *Synagris*, 27, 125, 126, 198, 200,
 202, 227, **318**.
vicaria var. *luteopicta*, *Synagris*, 125,
 227, **319**.
violator, *Osprynchotus*, 211, 212, 220.
vitripennis, *Icaria*, 345.
Ropalidia, 345.
vulneratus, *Odynerus*, 314.
walkeri, *Eumenes*, 282.
Odynerus, 314.
Rhynchium, 314.
wellmani, *Odynerus*, 128, 314.
Wettsteinia, 14, 30, 44.
wheeleri, *Celonites*, 269.
wheeleri var. *immaculatus*, *Celonites*,
 269.
whiteanus, *Odynerus*, 314.
xanthaspis, *Eumenes*, 282.
xanthosoma, *Odynerus*, 229, 328.
Rhynchalastor, 127, 229, **328**.
xanthura, *Icaria*, 340, 345.
Ropalidia, 345.

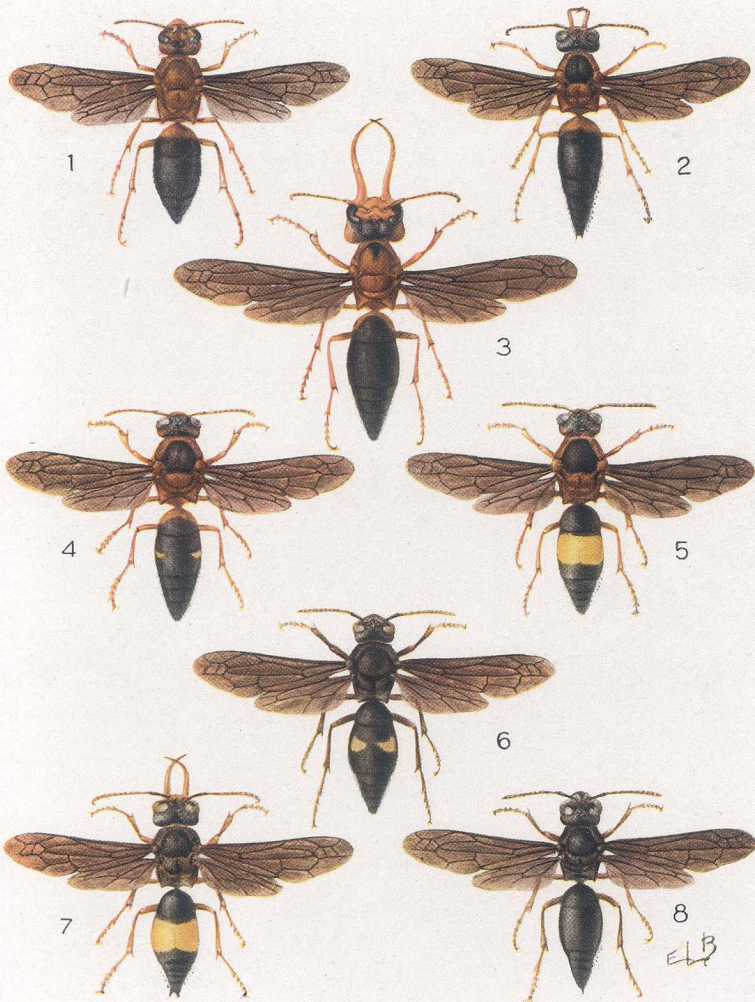
- xanthura*, *Synagris*, 319, 321, 325.
xanthurum, *Rhynchium*, 315.
xanthurus, *Eumenes maxillosus* var., 58, 59, 60, 61 (Fig. 45, distribution), 67.
 Odynerus, 126, 145, **315**.
Xylocopa, 105.

yngvei, *Odynerus*, 186, 315.

zairensis, **Ancistrocerus**, 6, 113, **117**
 (Figs. 111–115), **289**.
zebra, *Ancistrocerus*, 120, **289**.
 Odynerus, 289.
zebroides, *Odynerus*, 291.
Zethinæ, 13, 22, **30**, **271**.
Zethoides, 14.
zethoides, *Raphiglossa*, 30 (ethology).
Zethus, 6, 14, 21, 23, 24, 26, **30**, 31
 (ethology), 35, 36, 40, 42, 43, 44,
 45, **271**.

carinatus, 44.
cœruleopennis, 271.
cyanopterus, 31 (ethology).
delagoensis, 31, 35, **271**.
favillaceus, 271.
geniculatus, 32 (ethology).
gigas, 31.
guineensis, 280.
jurinei, 31.
lobulatus, 32 (ethology), 212.
mexicanus, 32 (ethology), 40.
pubescens, 271.
rodhaini, 6, 31, **33** (Figs. 2–5), 265,
 271. Pl. I, Fig. 5.
romandinus, 31 (ethology), 32.
spinipes, 31 (ethology).
strigosus, 44.
Zethusc ulus, 14, 30, 31, 32.
 lobulatus, 32.
zonatum, *Rhynchium*, 315.
zonatus, *Odynerus*, 315.

Fig. 1. *Paramischocyttarus buyssoni* Grib. X 2.Fig. 2. *Pachymenes congensis* J. Beq. X 3.Fig. 3. *Eumenes maxillosus* var. *tropicalis* (Sauss.) X 1.Fig. 4. *Odynerus osborni* J. Beq. X 1.Fig. 5. *Zethus rodhaini* J. Beq. X 2.Fig. 6. *Synagris æstuans* (Fabr.) X 1.Fig. 7. *Polybioides tabida* (Fabr.) X 2.Fig. 8. *Ancistrocerus kisanangani* J. Beq. X 3.Fig. 9. *Belonogaster juncus* (Fabr.) X 1.Fig. 10. *Pclistes fastidiosus* Sauss. X 3.Fig. 11. *Ropalidia guttatipennis* (Sauss.) X 2.



Color varieties of *Synagris cornuta* (Linné)

All natural size

Fig. 1. Variety *rufithorax* J. Beq.

Fig. 2. Variety *cornuta* (Linné).

Fig. 3. Variety *ituriensis* J. Beq.

Fig. 4. Variety *didieri* (R. du Buyss.).

Fig. 5. Variety *basalis* (Mocs.).

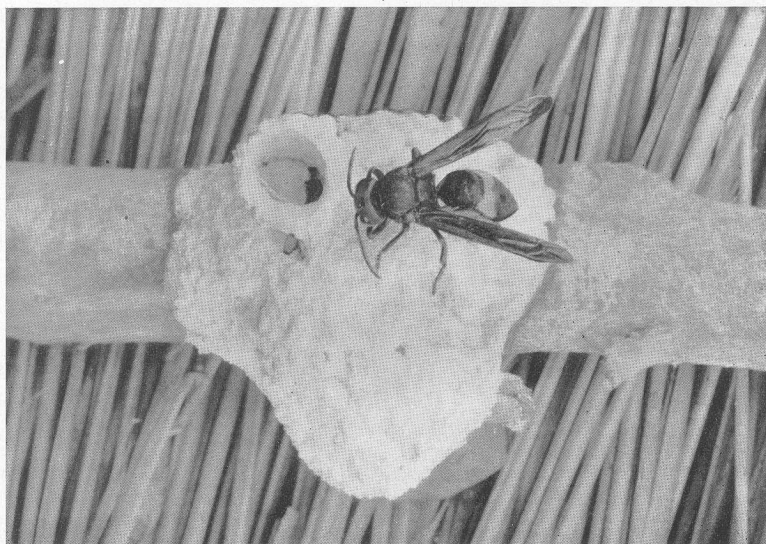
Fig. 6. Variety *maculata* J. Beq.

Fig. 7. Variety *flavofasciata* J. Beq.

Fig. 8. Variety *similis* J. Beq.



Colony of *Synagris cornuta* (Linné), at Bengamisa, September 1914.



1



2

Fig. 1. Nest of *Synagris cornuta* (Linné) var. *flavofasciata* J. Bequaert, at Medje, June 1914.

Fig. 2. Nest of *Polybioides tabida* (Fabricius), at Medje, April 1914.



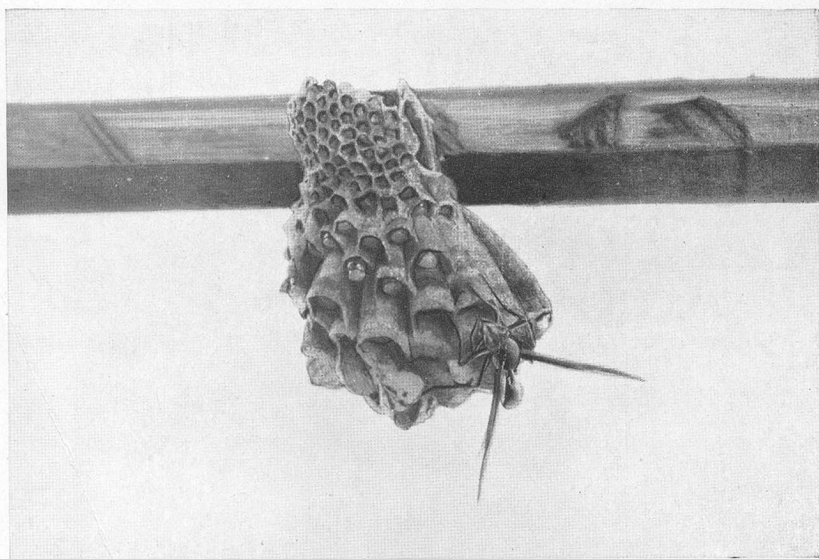
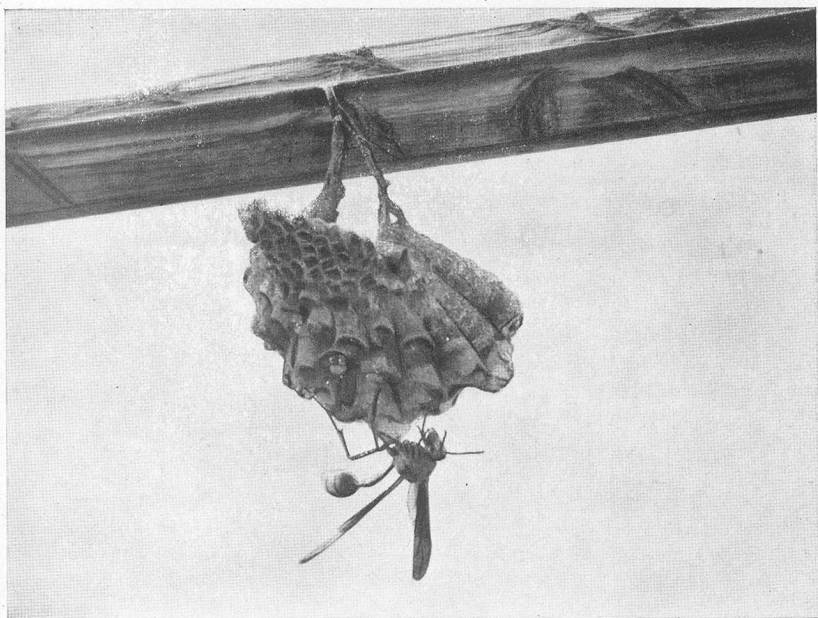
1



2

Fig. 1. Nest of *Polybioides melaina* G. Meade Waldo, at Stanleyville, August 1909.

Fig. 2. The same nest of *P. melaina*, partly destroyed.



Nest of *Belonogaster dubius* Kohl, at Faradje, September 1912; photographed from two different sides.